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Transitive Graphs With Fewer Than Twenty Vertices

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Abstract. A graph is called *transitive* if its automorphism group acts transitively on the vertex set. We list the 1031 transitive graphs with fewer than 20 vertices, together with many of their properties.

1. Introduction. A *transitive* graph is one whose automorphism group acts transitively on its vertices. In this report we present a catalogue of all transitive graphs with fewer than 20 vertices. The only other catalogue of transitive graphs appears to be that of Yap [5], who considered transitive graphs with 13 or fewer vertices except those of degree 5. Unfortunately, Yap missed three graphs with 12 vertices. Our method of construction was completely different from that of Yap and involved extensive machine computation. However, a description of the constructive method would be too lengthy to include here. It will be presented in a future paper.

The number of transitive graphs found for each order and degree appears in Table 1. The same information, restricted to connected transitive graphs, appears in Table 2. Note that in both tables, the total for each order includes those with degree not in the table. Also, note that a transitive graph with n vertices and degree d is connected if $d \geqslant (n-1)/2$.

2. Terminology. Basic graph terminology not defined here can be found in Behzad and Chartrand [1]. Suppose X is a graph with vertex set $V(X) = \{1, 2, \ldots, n\}$ and edge set $E(X)$. We denote by $\mathrm{Aut}(X)$ the automorphism group of X and by $\mathrm{Aut}_1(X)$ the stabilizer in $\mathrm{Aut}(X)$ of vertex 1. We call X *transitive* if the action of $\mathrm{Aut}(X)$ on $V(X)$ is transitive.

Two partitions of $V(X)$ will be defined. Firstly, $\partial(X)$ is the partition of $V(X)$ such that vertices v and w are in the same cell if and only if $\partial(1, v) = \partial(1, w)$, where $\partial(x, y)$ is the distance in X between x and y. By convention, $\partial(x, y) = \infty$ if x and y are in different components of X. Secondly, $\alpha(X)$ is the partition of $V(X)$ whose cells are the orbits of $\mathrm{Aut}_1(X)$. We will say that X is *distance regular* if, for any cells $C_1, C_2 \in \partial(X)$, not necessarily distinct, and for any $v, w \in C_1$, vertex v is adjacent to the same number of vertices in C_2 as is vertex w. We will say that X is *distance transitive* if $\partial(X) = \alpha(X)$. For connected transitive graphs, these definitions correspond to those of Biggs [2]. It is easy to show that a distance transitive graph is also distance regular, but the converse need not be true.

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order	degree 0	1	2	3	4	5	6	7	8	total
1	1									1
2	1	1								2
3	1	0	1							2
4	1	1	1	1						4
5	1	0	1	0	1					3
6	1	1	2	2	1	1				8
7	1	0	1	0	1	0	1			4
8	1	1	2	3	3	2	1	1		14
9	1	0	2	0	3	0	2	0	1	9
10	1	1	2	3	4	4	3	2	1	22
11	1	0	1	0	2	0	2	0	1	8
12	1	1	4	7	11	13	13	11	7	74
13	1	0	1	0	3	0	4	0	3	14
14	1	1	2	3	6	6	9	9	6	56
15	1	0	3	0	8	0	12	0	12	48
16	1	1	3	7	16	27	40	48	48	286
17	1	0	1	0	4	0	7	0	10	36
18	1	1	4	7	16	24	38	45	54	380
19	1	0	1	0	4	0	10	0	14	60

TABLE 1. *Number of transitive graphs*

Suppose that X has diameter δ, not necessarily finite. Then X will be called *ntipodal* if, for distinct vertices u, v, w, we have $\partial(u, v) = \partial(u, w) = \delta$ implies $\partial(v, w) = \delta$. A new graph $D = D(X)$, intuitively "X plus diagonals", can be defined by

$$V(D) = V(X) \quad \text{and} \quad E(D) = E(X) \cup \{vw \mid \partial(v, w) = \delta\},$$

where vw is the edge $\{v, w\}$. Obviously, $\mathrm{Aut}(X) \leqslant \mathrm{Aut}(D)$, so that D is transitive if X is.

A *t-arc* of X is a sequence $(v_0, v_1, \ldots, v_t)$ of vertices of X such that $v_{i-1}v_i \in E(X)$ for $1 \leqslant i \leqslant t$ and $v_{i-1} \neq v_{i+1}$ for $1 \leqslant i < t$. The *arc-transitivity* of X is defined to be the maximum value of t such that $\mathrm{Aut}(X)$ acts transitively on the t-arcs of X. A discussion of arc-transitivity may be found in Biggs [2].

Let π be a partition of $V(X)$ into possibly-empty subsets V_1 and V_2. The operation of *switching X about π* produces a graph Y, where

$$V(Y) = V(X), \quad \text{and}$$

$$E(Y) = \{vw \in E(X) \mid v, w \in V_1 \text{ or } v, w \in V_2\} \cup \{vw \notin E(X) \mid v \in V_1 \text{ and } w \in V_2\}.$$

order	degree 0	1	2	3	4	5	6	7	8	total
1	1									1
2	0	1								1
3	0	0	1							1
4	0	0	1	1						2
5	0	0	1	0	1					2
6	0	0	1	2	1	1				5
7	0	0	1	0	1	0	1			3
8	0	0	1	2	3	2	1	1		10
9	0	0	1	0	3	0	2	0	1	7
10	0	0	1	3	3	4	3	2	1	18
11	0	0	1	0	2	0	2	0	1	7
12	0	0	1	4	10	12	13	11	7	64
13	0	0	1	0	3	0	4	0	3	13
14	0	0	1	3	5	6	8	9	6	51
15	0	0	1	0	7	0	12	0	12	44
16	0	0	1	4	13	25	39	47	48	272
17	0	0	1	0	4	0	7	0	10	35
18	0	0	1	5	12	23	36	45	53	365
19	0	0	1	0	4	0	10	0	14	59

TABLE 2. *Number of connected transitive graphs*

Switching provides an equivalence relation on the set of all graphs. Each equivalence class contains at most one transitive graph of odd order (see [4]). However, if the number of vertices is even, an equivalence class may contain many transitive graphs. Details appear in Section 5.

An important object associated with switching is the *switching graph*. The switching graph of X, denoted $\mathrm{Sw}(X)$, is defined to have vertex set $\{v \mid v \in V(X)\} \cup \{v' \mid v \in V(X)\}$ and edge set

$$E(\mathrm{Sw}(X)) = E(X) \cup \{v'w' \mid vw \in E(X)\} \cup \{vw' \mid v \neq w \text{ and } vw \notin E(X)\}.$$

If X has n vertices, $\mathrm{Sw}(X)$ has $2n$ vertices and is regular with degree $n - 1$. Godsil [3] has shown that two graphs X and Y are equivalent under switching if and only if their switching graphs are isomorphic. Clearly, $\mathrm{Sw}(X)$ is transitive whenever X is, but it is possible for a transitive switching graph to be not derived from any transitive graph The only example in our catalogue is the icosahedron L37.

A large number of transitive graphs can be obtained from groups by means of th Cayley graph construction. Let G be a group, and H be a subset of G such that

(i) H does not contain the identity, and

(ii) $g \in H \Rightarrow g^{-1} \in H$ for all $g \in G$.

The *Cayley graph* of G with *connection set* H is the graph $X = X(G, H)$ with

$$V(X) = G \quad \text{and} \quad E(X) = \{\{g, gh\} \mid g \in G, h \in H\}.$$

X is a transitive graph on which G acts (by left multiplication) as a regular subgroup of $\mathrm{Aut}(X)$. If in fact $\mathrm{Aut}(X) \cong G$, X is called a *graphical regular representation* (GRR) of G. In Section 5 we will give some examples of transitive graphs which are not Cayley graphs for any group.

Let X and Y be any graphs. We will define three products of X and Y, all of which have vertex set $V(X) \times V(Y)$.

(a) The *cartesian* product $X \times Y$ has

$$E(X \times Y) = \{(x_1, y_1)(x_2, y_2) \mid x_1 = x_2 \text{ and } y_1y_2 \in E(Y), \text{ or } y_1 = y_2 \text{ and } x_1x_2 \in E(X)\}.$$

(b) The *tensor* product (*conjunction*) $X * Y$ has

$$E(X * Y) = \{(x_1, y_1)(x_2, y_2) \mid x_1x_2 \in E(X) \text{ and } y_1y_2 \in E(Y)\}.$$

(c) The *lexicographic* product (*composition*) $X[Y]$ has

$$E(X[Y]) = \{(x_1, y_1)(x_2, y_2) \mid x_1x_2 \in E(X), \text{ or } x_1 = x_2 \text{ and } y_1y_2 \in E(Y)\}.$$

Note that $X \times Y \cong Y \times X$ and $X * Y \cong Y * X$, but that $X[Y] \ncong Y[X]$, in general.

3. Groups of Order n, $5 \leqslant n \leqslant 19$. In this section we give a list of all groups with orders 5 through 19, with their elements and some statistics. This information will be needed in Section 4, where we give representations of transitive graphs as Cayley graphs. Within each order, the abelian groups precede the nonabelian ones. Each group is generated by those elements $A, B, C, \ldots$ which appear in the list of relators. Inverses $A^{-1}, B^{-1}, C^{-1}, \ldots$ are abbreviated to $Z, Y, X, \ldots$, respectively. A number following a letter raises that letter to the given power. A number which begins a word raises that whole word to the given power.

For example, BA3 means BA^3, 3Z2C means $(A^{-2}C)^3$.

(a) *List of Relators*: For example, the relators 4A 4B ZYAB show that group 16-3 is $\langle A, B \mid A^4 = B^4 = A^{-1}B^{-1}AB = 1 \rangle$.

(b) *Statistics*:

INV = number of involutions,
EXP = exponent,
CNTR = order of centre,
COMM = order of commutator subgroup,
NSQ = number of squares (including 1).

(c) *List of Elements*: Each element is given as a word of shortest possible length in the generators and their inverses. Those words before the comma are involu-

tions, while those after the comma are one element of each pair $\{g, g^{-1}\}$, where the order of g is greater than 2. If there is no comma, each element is an involution.

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GROUP NUMBER  5-1   RELATORS: 5A.
 INV= 0  EXP= 5  CNTR= 5  COMM= 1  NSQ= 5
 ELEMENTS: , A A2.

GROUP NUMBER  6-1   RELATORS: 6A.
 INV= 1  EXP= 6  CNTR= 6  COMM= 1  NSQ= 3
 ELEMENTS: A3, A A2.

GROUP NUMBER  6-2   RELATORS: 2A 3B 2AB.
 INV= 3  EXP= 3  CNTR= 1  COMM= 3  NSQ= 3
 ELEMENTS: A AB AY, B.

GROUP NUMBER  7-1   RELATORS: 7A.
 INV= 0  EXP= 7  CNTR= 7  COMM= 1  NSQ= 7
 ELEMENTS: , A A2 A3.

GROUP NUMBER  8-1   RELATORS: 8A.
 INV= 1  EXP= 8  CNTR= 8  COMM= 1  NSQ= 4
 ELEMENTS: A4, A A2 A3.

GROUP NUMBER  8-2   RELATORS: 4A 2B ZBAB.
 INV= 3  EXP= 4  CNTR= 8  COMM= 1  NSQ= 2
 ELEMENTS: B A2 A2B, A AB.

GROUP NUMBER  8-3   RELATORS: 2A 2B 2C 2AB 2AC 2BC.
 INV= 7  EXP= 2  CNTR= 8  COMM= 1  NSQ= 1
 ELEMENTS: A B C AB AC BC ABC.

GROUP NUMBER  8-4   RELATORS: 4A 2B 2AB.
 INV= 5  EXP= 4  CNTR= 2  COMM= 2  NSQ= 2
 ELEMENTS: B A2 AB BA A2B, A.

GROUP NUMBER  8-5   RELATORS: 4A Y2A2 YABA.
 INV= 1  EXP= 4  CNTR= 2  COMM= 2  NSQ= 2
 ELEMENTS: A2, A B AB.

GROUP NUMBER  9-1   RELATORS: 9A.
 INV= 0  EXP= 9  CNTR= 9  COMM= 1  NSQ= 9
 ELEMENTS: , A A2 A3 A4.

GROUP NUMBER  9-2   RELATORS: 3A 3B ZYAB.
 INV= 0  EXP= 3  CNTR= 9  COMM= 1  NSQ= 9
 ELEMENTS: , A B AB AY.

GROUP NUMBER 10-1   RELATORS: 10A.
 INV= 1  EXP=10  CNTR=10  COMM= 1  NSQ= 5
 ELEMENTS: A5, A A2 A3 A4.

GROUP NUMBER 10-2   RELATORS: 5A 2B 2AB.
 INV= 5  EXP= 5  CNTR= 1  COMM= 5  NSQ= 5
 ELEMENTS: B AB BA A2B BA2, A A2.

GROUP NUMBER 11-1   RELATORS: 11A.
 INV= 0  EXP=11  CNTR=11  COMM= 1  NSQ=11
 ELEMENTS: , A A2 A3 A4 A5.

GROUP NUMBER 12-1   RELATORS: 12A.
 INV= 1  EXP=12  CNTR=12  COMM= 1  NSQ= 6
 ELEMENTS: A6, A A2 A3 A4 A5.

GROUP NUMBER 12-2   RELATORS: 6A 2B ZYAB.
 INV= 3  EXP= 6  CNTR=12  COMM= 1  NSQ= 3
 ELEMENTS: B A3 A3B, A A2 AB A2B.

GROUP NUMBER 12-3   RELATORS: 6A 2B 2AB.
 INV= 7  EXP= 6  CNTR= 2  COMM= 3  NSQ= 3
 ELEMENTS: B AB BA A3 A2B BA2 A3B, A A2.

GROUP NUMBER 12-4   RELATORS: 2A 2B 3C BXAC BAXBC 2AB.
 INV= 3  EXP= 3  CNTR= 1  COMM= 4  NSQ= 9
 ELEMENTS: A B AB, C AC AX BC.
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GROUP NUMBER 12-5   RELATORS: 6A Y2A3 AYAB.
 INV= 1  EXP= 6  CNTR= 2  COMM= 3  NSQ= 4
 ELEMENTS: B2, A B A2 AB BA.

GROUP NUMBER 13-1   RELATORS: 13A.
 INV= 0  EXP=13  CNTR=13  COMM= 1  NSQ=13
 ELEMENTS: , A A2 A3 A4 A5 A6.

GROUP NUMBER 14-1   RELATORS: 14A.
 INV= 1  EXP=14  CNTR=14  COMM= 1  NSQ= 7
 ELEMENTS: A7, A A2 A3 A4 A5 A6.

GROUP NUMBER 14-2   RELATORS: 7A 2B 2AB.
 INV= 7  EXP= 7  CNTR= 1  COMM= 7  NSQ= 7
 ELEMENTS: B AB BA A2B BA2 A3B BA3, A A2 A3.

GROUP NUMBER 15-1   RELATORS: 15A.
 INV= 0  EXP=15  CNTR=15  COMM= 1  NSQ=15
 ELEMENTS: , A A2 A3 A4 A5 A6 A7.

GROUP NUMBER 16-1   RELATORS: 16A.
 INV= 1  EXP=16  CNTR=16  COMM= 1  NSQ= 8
 ELEMENTS: A8, A A2 A3 A4 A5 A6 A7.

GROUP NUMBER 16-2   RELATORS: 8A 2B ZYAB.
 INV= 3  EXP= 8  CNTR=16  COMM= 1  NSQ= 4
 ELEMENTS: B A4 A4B, A A2 AB A3 A2B A3B.

GROUP NUMBER 16-3   RELATORS: 4A 4B ZYAB.
 INV= 3  EXP= 4  CNTR=16  COMM= 1  NSQ= 4
 ELEMENTS: A2 B2 A2B2, A B AB AY A2B AB2.

GROUP NUMBER 16-4   RELATORS: 4A 2B 2C ZBAB 2BC ZCAC.
 INV= 7  EXP= 4  CNTR=16  COMM= 1  NSQ= 2
 ELEMENTS: B C A2 BC A2B A2C A2BC, A AB AC ABC.

GROUP NUMBER 16-5   RELATORS: 2A 2B 2C 2D 2AB 2AC 2AD 2BC 2BD 2CD.
 INV=15  EXP= 2  CNTR=16  COMM= 1  NSQ= 1
 ELEMENTS: A B C D AB AC AD BC BD CD ABC ABD ACD BCD ABCD.

GROUP NUMBER 16-6   RELATORS: 4A 2B 2C 2AB ZCAC 2CB.
 INV=11  EXP= 4  CNTR= 4  COMM= 2  NSQ= 2
 ELEMENTS: B C A2 AB BA BC A2B A2C ABC BAC A2BC, A AC.

GROUP NUMBER 16-7   RELATORS: 4A 2B X2A2 AXAC XBCB ZBAB.
 INV= 3  EXP= 4  CNTR= 4  COMM= 2  NSQ= 2
 ELEMENTS: B A2 A2B, A C AB AC BC ABC.

GROUP NUMBER 16-8   RELATORS: 4A 2B X2A2 AXAC 2BC ZBAB.
 INV= 7  EXP= 4  CNTR= 4  COMM= 2  NSQ= 2
 ELEMENTS: B A2 BC BX A2B ABC ABX, A C AB AC.

GROUP NUMBER 16-9   RELATORS: 4A 2B X2B YAXAC ZBAB.
 INV= 7  EXP= 4  CNTR= 4  COMM= 2  NSQ= 3
 ELEMENTS: B A2 AC AX CA ZC A2B, A C AB A2C.

GROUP NUMBER 16-10  RELATORS: 4A 4B AYAB.
 INV= 3  EXP= 4  CNTR= 4  COMM= 2  NSQ= 3
 ELEMENTS: A2 B2 A2B2, A B AB BA A2B AB2.

GROUP NUMBER 16-11  RELATORS: 8A 2B Z5BAB.
 INV= 3  EXP= 8  CNTR= 4  COMM= 2  NSQ= 4
 ELEMENTS: B ABZ A4, A A2 AB BA A3 A2B.

GROUP NUMBER 16-12  RELATORS: 8A 2B 2AB.
 INV= 9  EXP= 8  CNTR= 2  COMM= 4  NSQ= 4
 ELEMENTS: B AB BA A2B BA2 A4 A3B BA3 A4B, A A2 A3.

GROUP NUMBER 16-13  RELATORS: 8A 2B Z3BAB.
 INV= 5  EXP= 8  CNTR= 2  COMM= 4  NSQ= 4
 ELEMENTS: B A2B ABA ABZ A4, A A2 AB BA A3.

GROUP NUMBER 16-14  RELATORS: 8A Y2A4 AYAB.
 INV= 1  EXP= 8  CNTR= 2  COMM= 4  NSQ= 4
 ELEMENTS: B2, A B A2 AB BA A3 A2B.
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GROUP NUMBER 17-1   RELATORS: 17A.
 INV= 0  EXP=17  CNTR=17  COMM= 1  NSQ=17
 ELEMENTS: , A A2 A3 A4 A5 A6 A7 A8.

GROUP NUMBER 18-1   RELATORS: 18A.
 INV= 1  EXP=18  CNTR=18  COMM= 1  NSQ= 9
 ELEMENTS: A9, A A2 A3 A4 A5 A6 A7 A8.

GROUP NUMBER 18-2   RELATORS: 6A 3B ZYAB.
 INV= 1  EXP= 6  CNTR=18  COMM= 1  NSQ= 9
 ELEMENTS: A3, A B A2 AB AY A2B A2Y A3B.

GROUP NUMBER 18-3   RELATORS: 3A 6B AYAB.
 INV= 3  EXP= 6  CNTR= 3  COMM= 3  NSQ= 9
 ELEMENTS: B3 AB3 BAB2, A B AB BA B2 AB2 AY2.

GROUP NUMBER 18-4   RELATORS: 9A 2B 2AB.
 INV= 9  EXP= 9  CNTR= 1  COMM= 9  NSQ= 9
 ELEMENTS: B AB BA A2B BA2 A3B BA3 A4B BA4, A A2 A3 A4.

GROUP NUMBER 18-5   RELATORS: 3A 3B 2C 2AC 2BC ZYAB.
 INV= 9  EXP= 3  CNTR= 1  COMM= 9  NSQ= 9
 ELEMENTS: C AC BC CA CB ABC ACB BCA CAB, A B AB AY.

GROUP NUMBER 19-1   RELATORS: 19A.
 INV= 0  EXP=19  CNTR=19  COMM= 1  NSQ=19
 ELEMENTS: , A A2 A3 A4 A5 A6 A7 A8 A9.
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4. Transitive Graphs of Order n, $2 \leqslant n \leqslant 19$. The catalogue in this section contains data on every transitive graph with n vertices and degree d, for $2 \leqslant n \leqslant 9$ (any d) and $10 \leqslant n \leqslant 19$ (for $d \leqslant (n-1)/2$). Those with the remaining degrees can be obtained by complementation. In describing the information presented for some particular graph, we will refer to the graph as X, and use n and d to denote its order and degree, respectively.

(a) *Set Notation*: A set of positive integers can be written as an octal integer by putting bit i equal to 1 if and only if i is in the set. The bits are numbered from 1 starting at the right hand (low order) end. For example, 251 (octal) is 10101001 (binary) and so represents the set $\{1, 4, 6, 8\}$.

(b) *First Line of Data*: The first item in this line is the *name* of X, for example L20 or P16. The letter indicates the order of X (A for 1, B for 2, etc.), and the numbers are allotted sequentially within each order. Care must be taken to avoid confusing names like $K3$ with the commonly accepted notations [1] for special graphs, for example K_3, C_5, $K_{3,4}$. The latter notations will be used in this description of the catalogue, but *never* in the catalogue itself.

We now describe the other pieces of information which may occur on the first line.

(i) DEG: degree of X.

(ii) F: flags associated with X. Each flag is a single letter whose presence indicates a special property. If no flags apply, the F is omitted. The flags used are listed below.

X = disconnected.

N = not a Cayley graph.

T = distance transitive.

R = distance regular but not distance transitive (only case is P84).

V = Aut(X) acts primitively on $V(X)$.

I = Aut(X) satisfies this condition: For any $v, w \in V(X)$ there is $\alpha \in \mathrm{Aut}(X)$ such that $v^\alpha = w$ and $w^\alpha = v$.

A = antipodal.

S = self-complementary.

P = planar.

(iii) AUT: order of $\mathrm{Aut}_1(X)$.

(iv) P: partitions $\partial(X)$ and $\alpha(X)$. Each digit or letter gives the size of one cell of a partition π of $V(X)$. Letters are used for cell sizes over 9; A for 10, B for 11, etc.

Case 1: If $n = 2$ or X is not a GRR, then π is $\alpha(X)$. The cells of $\alpha(X)$ are grouped by commas into the cells of $\partial(X)$. For example, P = (1, 4, 24, 1) indicates that $\alpha(X)$ has one 4-cell at distance 1 from vertex 1, a 2-cell and a 4-cell at distance 2, and a single 1-cell at distance 3. If X is disconnected, only vertices in the component containing vertex 1 are included; the presence of additional components is indicated by a "+" sign.

Case 2: If $n \neq 2$ and X is a GRR, then π is $\partial(X)$. To avoid confusion with Case 1, the cells are separated by slashes. For example, P = (1/6/8/1) indicates 6 vertices at distance 1 from vertex 1, 8 vertices at distance 2, and 1 vertex at distance 3.

(v) GIR: girth of X, unless X is acyclic.

(vi) CN: chromatic numbers of X and $\bar{X}$, respectively.

(vii) T: arc-transitivity of X, unless $\mathrm{Aut}(X)$ is not transitive on 1-arcs, or $d = 0$, or $d = 2$.

(viii) Any other text on the first line indicates a common name for X, for example "PETERSEN GRAPH".

(c) *Adjacency Matrix* (omitted if $d = 0$).

$$A = a_2\ a_3\ a_4\ a_5, a_6 \cdots a_n.$$

Each a_i is an octal representation (see part (a)) of the set of vertices preceding vertex i which are adjacent to i. Note that a_1 is omitted. The labelling of the vertices of X is consistent with the partition P described above. For example, if P = (1, 4, 24, 1), $\alpha(X)$ is {1|2, 3, 4, 5|6, 7|8, 9, 10, 11|12} and $\partial(X)$ is {1|2, 3, 4, 5|6, 7, 8, 9, 10, 11|12}.

Example: If A = 1 1 6, we have 2 adjacent to 1, 3 adjacent to 1 and 4 adjacent to 2 and 3.

(d) *Eigenvalues of Adjacency Matrix* (omitted if X is disconnected).

$$E = m_1\lambda_1\ m_2\lambda_2 \cdots.$$

Each field gives one eigenvalue of the adjacency matrix of X. If the eigenvalue has multiplicity other than one, this multiplicity is written immediately before the eigenvalue, using an intervening "+" for nonnegative eigenvalues. If the eigenvalues for X are $\lambda_1 \leqslant \lambda_2 \leqslant \cdots \leqslant \lambda_n$, those for $\bar{X}$ are $-\lambda_{n-1} - 1 \leqslant -\lambda_{n-2} - 1 \leqslant \cdots \leqslant -\lambda_1 - 1 \leqslant n - d - 1$.

Example: $E = -4\ 3 - \cdot 4391\ 2 + 0\ 1 \cdot 3417\ 5$
—the eigenvalues are −0·4391 (3 times), 0 (twice) and −4, 1·3417, 5 (once each).

(e) *Independent Sets and Cliques* (omitted if X is disconnected).

$$K = (\alpha_3\ \alpha_4, \ldots, \beta_3\ \beta_4 \cdots).$$

α_i is the number of independent sets of size i in X, i.e. cliques of size i in $\overline{X}$, which include vertex 1.

β_i is the number of cliques of size i in X which include vertex 1.

Those numbers before the comma are α's; those after the comma are β's. The total number of independent sets or cliques of size i in X is $n\alpha_i/i$ or $n\beta_i/i$, respectively.

Example: $K = (, 4\ 1)$. X has no independent sets of size 3 or greater. Vertex 1 is contained in 4 triangles and 1 clique of size 4.

(f) *Representations of X.* The data provided about X contain a number of descriptors expressing X as a product etc. In explaining each descriptor type, Y and Z stand for the names of transitive graphs in the catalogue. As before, n and d are the order and degree of X, respectively. The variable i indicates a positive integer.

(i) $-Y$: complement of Y, unless X is self-complementary.

(ii) $i[Y]$: X is the disjoint union of i copies of Y ($i > 1$), unless $d \leqslant 1$

(iii) $L(Y)$: linegraph of Y, unless $d \leqslant 2$.

(iv) $-L(Y)$: complement of $L(Y)$, unless $d \leqslant 2$ or X is complete.

(v) $SW(Y)$: switching graph of Y.

(vi) $SW(Y+)$: switching graph of the disjoint union $Y \cup K_1$, unless Y is complete or empty. The only example is L37. All switching graphs in the catalogue are either type (v) or type (vi).

(vii) $D(Y)$: Y plus diagonals (see Section 2), provided Y has diameter at least 3 and is connected.

(viii) $-D(Y)$: complement of $D(Y)$. This notation is omitted if Y is bipartite and has diameter 3. In that case $-D(Y)$ is the disjoint union of two cliques. Y is connected with diameter $\geqslant 3$.

(ix) $Wi(Y)$: generalized linegraph of subdivision graph ($1 \leqslant i \leqslant 9$). Form a multigraph from Y by replacing each edge by i parallel edges. Then subdivide each edge with a new vertex and take the linegraph of the result. Omitted if Y has degree $\leqslant 1$, or X has degree 2.

Every linegraph in the catalogue is of type (iii) or type (ix) except these

$$L(K_{1,m}) = K_m \qquad (2 \leqslant m \leqslant 19),$$

$$L(K_{3,m}) = K_3 \times K_m \qquad (4 \leqslant m \leqslant 6).$$

(x) $-Wi(Y)$: complement of $Wi(Y)$ ($1 \leqslant i \leqslant 9$), unless Y has degree $\leqslant 1$, or $Wi(Y)$ has degree 2.

(xi) $Y[Z]$: lexicographic product of Y around Z, unless $d \leqslant 1$. If Y is empty (i.e. $\overline{Y}$ is complete), the notation (ii) is used instead.

(xii) $Y \times Z$: cartesian product of Y and Z, unless either Y or Z is empty.

(xiii) $-Y \times Z$: complement of $Y \times Z$, unless X is complete.

(xiv) $Y * Z$: tensor product of Y and Z, unless $d \leqslant 1$.

(xv) $-Y * Z$: complement of $Y * Z$, unless X is either empty or complete.

(xvi) i/m: X is the Cayley graph $X(G, H)$, where G is the ith group of order n, and the connection set H is specified by the octal number m (see (a)). The groups and their elements are numbered in the order they are listed in Section 3; an element and its inverse have the same ordinal. H is not canonical in any sense.

Example: If $n = 16$, the notation 3/123 represents $X(G, H)$, where G is group 16-3 and H is $\{A^2, B^2, B^{\pm 1}, (AB^{-1})^{\pm 1}\}$. Cayley graph representation is only given if $2 \leqslant d \leqslant (n-1)/2$.

Orders two through fifteen are presented here. Sixteen through nineteen appear in he microfiche supplement accompanying this issue.

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  TRANSITIVE GRAPHS ON  2 VERTICES

B1  DEG=0 F=XTVIAP AUT=1  P=(1,+)  CN=1,2
-B2 SW(A1)

B2  DEG=1 F=TVIAP AUT=1  P=(1,1)  CN=2,1  T=1
A=1  E=-1 1  K=(,)  -B1

  TRANSITIVE GRAPHS ON  3 VERTICES

C1  DEG=0 F=XTVIAP AUT=2  P=(1,+)  CN=1,3
-C2 -L(C2)

C2  DEG=2 F=TVIAP AUT=2  P=(1,2)  GIR=3 CN=3,1   TRIANGLE
A=1 3  E=2-1 2  K=(,1)  -C1

  TRANSITIVE GRAPHS ON  4 VERTICES

D1  DEG=0 F=XTVIAP AUT=6  P=(1,+)  CN=1,4
-D4

D2  DEG=1 F=XTIP AUT=2  P=(1,1,+)  CN=2,2  T=1
A=1 0 4  -D3 -L(D3) SW(B1) SW(B2) -B2XB2

D3  DEG=2 F=TIAP AUT=2  P=(1,2,1)  GIR=4 CN=2,2   SQUARE
A=1 1 6  E=-2 2+0 2  K=(,)  -D2 B2[B1] B2XB2 -B1XB2 -B2*B2

D4  DEG=3 F=TVIAP AUT=6  P=(1,3)  GIR=3 CN=4,1  T=2  TETRAHEDRON
A=1 3 7  E=3-1 3  K=(,3 1)  -D1 B2[B2]

  TRANSITIVE GRAPHS ON  5 VERTICES

E1  DEG=0 F=XTVIAP AUT=24  P=(1,+)  CN=1,5
-E3

E2  DEG=2 F=TVISP AUT=2  P=(1,2,2)  GIR=5 CN=3,3   PENTAGON
A=1 1 4 12  E=2-1.61803 2+.61803 2  K=(,)  -L(E2) 1/1

E3  DEG=4 F=TVIA AUT=24  P=(1,4)  GIR=3 CN=5,1  T=2
A=1 3 7 17  E=4-1 4  K=(,6 4 1)  -E1
```

TRANSITIVE GRAPHS ON 6 VERTICES

F1 DEG=0 F=XTVIAP AUT=120 P=(1,+) CN=1,6
-F8

F2 DEG=1 F=XTIP AUT=8 P=(1,1,+) CN=2,3 T=1
A=1 0 4 0,20 -F7 -L(D4)

F3 DEG=2 F=XTIP AUT=12 P=(1,2,+) GIR=3 CN=3,2
A=1 3 0 10,30 2[C2] -F5 SW(C2) 1/4 2/10

F4 DEG=2 F=TIAP AUT=2 P=(1,2,2,1) GIR=6 CN=2,3 HEXAGON
A=1 1 4 2,30 E=-2 2-1 2+1 2 K=(1,) -F6 SW(C1) -B2XC2 B2*C2 1/2 2/6

F5 DEG=3 F=TIA AUT=12 P=(1,3,2) GIR=4 CN=2,3 T=3
A=1 1 1 16,16 E=-3 4+0 3 K=(1,) -F3 -L(F3) D(F4) B2[C1] -B1XC2

F6 DEG=3 F=IP AUT=2 P=(1,12,2) GIR=3 CN=3,2 PRISM
A=1 1 5 12,26 E=2-2 2+0 1 3 K=(,1) -F4 -L(F4) W3(B2) -W1(C2) B2XC2 -B2*C2

F7 DEG=4 F=TIAP AUT=8 P=(1,4,1) GIR=3 CN=3,2 T=1 OCTAHEDRON
A=1 1 7 7,36 E=2-2 3+0 4 K=(,4) -F2 L(D4) -W1(F2) C2[B1] -B2XC1

F8 DEG=5 F=TVIA AUT=120 P=(1,5) GIR=3 CN=6,1 T=2
A=1 3 7 17,37 E=5-1 5 K=(,10 10 5 1) -F1 B2[C2] C2[B2]

TRANSITIVE GRAPHS ON 7 VERTICES

G1 DEG=0 F=XTVIAP AUT=720 P=(1,+) CN=1,7
-G4

G2 DEG=2 F=TVIP AUT=2 P=(1,2,2,2) GIR=7 CN=3,4 HEPTAGON
A=1 1 4 2,20 50 E=2-1.80194 2-.44504 2+1.24698 2 K=(3,) -G3 -D(G2) 1/1

G3 DEG=4 F=VI AUT=2 P=(1,22,2) GIR=3 CN=4,3
A=1 3 5 3,34 72 E=2-2.24698 2-.55496 2+.80194 4 K=(,3) -G2 -L(G2) D(G2)

G4 DEG=6 F=TVIA AUT=720 P=(1,6) GIR=3 CN=7,1 T=2
A=1 3 7 17,37 77 E=6-1 6 K=(,15 20 15 6 1) -G1

TRANSITIVE GRAPHS ON 8 VERTICES

H1 DEG=0 F=XTVIAP AUT=5040 P=(1,+) CN=1,8
-H14

H2 DEG=1 F=XTIP AUT=48 P=(1,1,+) CN=2,4 T=1
A=1 0 4 0,20 0 100 -H13

H3 DEG=2 F=XTIP AUT=16 P=(1,2,1,+) GIR=4 CN=2,4
A=1 1 6 0,20 20 140 2[D3] -H11 D2[B1] B2XD2 B2*D3 1/4 2/5 3/104 4/22 5/2

H4 DEG=2 F=TIAP AUT=2 P=(1,2,2,2,1) GIR=8 CN=2,4 OCTAGON
A=1 1 4 2,20 10 140 E=-2 2-1.41421 2+0 2+1.41421 2 K=(6 1,) -H12 1/10 4/11

H5 DEG=3 F=XTIP AUT=144 P=(1,3,+) GIR=3 CN=4,2 T=2
A=1 3 7 0,20 60 160 2[D4] -H8 SW(D2) SW(D4) D2[B2] 1/5 2/22 3/70 4/42 5/3

H6 DEG=3 F=I AUT=2 P=(1,12,22) GIR=4 CN=3,4
A=1 1 1 10,24 52 26 E=2-2.41421 -1 2+.41421 2+1 3 K=(3,) -H10 D(H4) 1/11
4/26

H7 DEG=3 F=TIAP AUT=6 P=(1,3,3,1) GIR=4 CN=2,4 T=2 CUBE
A=1 1 1 14,12 6 160 E=-3 3-1 3+1 3 K=(3 1,) -H9 SW(D1) SW(D3) -W4(B2) B2XD3
-B2XD4 B2*D4 2/11 3/45 4/15

H8 DEG=4 F=TIA AUT=144 P=(1,4,3) GIR=4 CN=2,4 T=3
A=1 1 1 1,36 36 36 E=-4 6+0 4 K=(3 1,) -H5 D(H7) B2[D1] D3[B1] -B1XD4

H9 DEG=4 F=I AUT=6 P=(1,13,3) GIR=3 CN=4,2
A=1 1 5 15,12 62 146 E=3-2 3+0 2 4 K=(,3 1) -H7 W4(B2) B2XD4 -B2XD3 -B2*D4

TRANSITIVE GRAPHS ON 8 VERTICES (CONTD)

H10 DEG=4 F=IP AUT=2 P=(1,22,12) GIR=3 CN=4,3 ANTIPRISM
A=1 1 5 13,6 54 162 E=2-2 2-1.41421 0 2+1.41421 4 K=(,3) -H6 -D(H4)

H11 DEG=5 F=I AUT=16 P=(1,14,2) GIR=3 CN=4,2
A=1 3 3 7,13 74 174 E=-3 4-1 2+1 5 K=(,6 2) -H3 -L(H3) -W2(D2) B2[D2] D3[B2]
-B1XD3 -B2XD2 -B2*D3

H12 DEG=5 F=I AUT=2 P=(1,122,2) GIR=3 CN=4,2
A=1 1 5 13,27 56 136 E=2-2.41421 2-1 2+.41421 1 5 K=(,6 1) -H4 -L(H4)
-W1(D3)

H13 DEG=6 F=TIA AUT=48 P=(1,6,1) GIR=3 CN=4,2 T=1
A=1 1 7 7,37 37 176 E=3-2 4+0 6 K=(,12 8) -H2 -W1(H2) B2[D3] D4[B1] -B1XD2
-B2XD1 -B2*D2

H14 DEG=7 F=TVIA AUT=5040 P=(1,7) GIR=3 CN=8,1 T=2
A=1 3 7 17,37 77 177 E=7-1 7 K=(,21 35 35 21 7 1) -H1 B2[D4] D4[B2]

TRANSITIVE GRAPHS ON 9 VERTICES

I1 DEG=0 F=XTVIAP AUT=40320 P=(1,+) CN=1,9
-I9

I2 DEG=2 F=XTIP AUT=144 P=(1,2,+) GIR=3 CN=3,3
A=1 3 0 10,0 30 40 240 3[C2] -I7 1/4 2/4

I3 DEG=2 F=TIP AUT=2 P=(1,2,2,2,2) GIR=9 CN=3,5 NONAGON
A=1 1 4 2,20 10 100 240 E=2-1.87939 2-1 2+.34730 2+1.53209 2 K=(10 4,) -I8
1/10

I4 DEG=4 F=TVIS AUT=8 P=(1,4,4) GIR=3 CN=3,3 T=1
A=1 3 1 11,24 12 154 162 E=4-2 4+1 4 K=(2,2) L(F5) -L(F5) C2XC2 -C2XC2 C2*C2
-C2*C2 2/12

I5 DEG=4 F=I AUT=2 P=(1,22,22) GIR=3 CN=3,3
A=1 3 1 1,34 32 124 252 E=2-2.87939 2-.65270 2+.53209 2+1 4 K=(3,1) -I6
-D(I3) 1/14

I6 DEG=4 F=I AUT=2 P=(1,22,22) GIR=3 CN=3,3
A=1 1 3 15,24 12 144 342 E=2-2 2-1.53209 2-.34730 2+1.87939 4 K=(1,3) -I5
D(I3) 1/11

I7 DEG=6 F=TIA AUT=144 P=(1,6,2) GIR=3 CN=3,3 T=1
A=1 1 1 17,17 17 176 176 E=2-3 6+0 6 K=(1,9) -I2 -L(I2) C2[C1] -C1XC2

I8 DEG=6 F=I AUT=2 P=(1,222,2) GIR=3 CN=5,3
A=1 3 5 13,27 17 174 372 E=2-2.53209 2-1.34730 2+0 2+.87939 6 K=(,10 4) -I3
-L(I3)

I9 DEG=8 F=TVIA AUT=40320 P=(1,8) GIR=3 CN=9,1 T=2
A=1 3 7 17,37 77 177 377 E=8-1 8 K=(,28 56 70 56 28 8 1) -I1 C2[C2]

TRANSITIVE GRAPHS ON 10 VERTICES

J1 DEG=0 F=XTVIAP AUT=362880 P=(1,+) CN=1,10

J2 DEG=1 F=XTIP AUT=384 P=(1,1,+) CN=2,5 T=1
A=1 0 4 0,20 0 100 0 400

J3 DEG=2 F=XTIP AUT=20 P=(1,2,2,+) GIR=5 CN=3,6
A=1 1 4 12,0 40 0 300 240 2[E2] 1/4 2/40

J4 DEG=2 F=TIAP AUT=2 P=(1,2,2,2,2,1) GIR=10 CN=2,5 POLYGON
A=1 1 4 2,20 10 100 40 600 E=-2 2-1.61803 2-.61803 2+.61803 2+1.61803 2
K=(15 10 1,) B2*E2 1/10 2/24

J5 DEG=3 F=I AUT=2 P=(1,12,22,2) GIR=4 CN=2,5
A=1 1 1 12,6 4 10 320 340 E=-3 2-1.61803 2-.61803 2+.61803 2+1.61803 3
K=(9 4 1,) D(J4) 1/3 2/7

TRANSITIVE GRAPHS ON 10 VERTICES (CONTD)

J6 DEG=3 F=IP AUT=2 P=(1,12,22,2) GIR=4 CN=3,5 PRISM
A=1 1 1 12,6 10 104 240 520 E=2-2.61803 2-.61803 2-.38197 1 2+1.61803 3
K=(9 4,) B2XE2 1/21 2/41

J7 DEG=3 F=NTVI AUT=12 P=(1,3,6) GIR=5 CN=3,5 T=3 PETERSEN GRAPH
A=1 1 1 10,22 10 102 144 224 E=4-2 5+1 3 K=(9 2,) -L(E3)

J8 DEG=4 F=XTI AUT=2880 P=(1,4,+) GIR=3 CN=5,2 T=2
A=1 3 7 17,0 40 140 340 740 2[E3] SW(E3) 1/24 2/140

J9 DEG=4 F=I AUT=32 P=(1,4,14) GIR=4 CN=3,5 T=1
A=1 1 1 1,36 30 106 106 630 E=2-3.23607 5+0 2+1.23607 4 K=(6 2,) E2[B1] 1/14
2/130

J10 DEG=4 F=TIA AUT=24 P=(1,4,4,1) GIR=4 CN=2,5 T=2
A=1 1 1 1,34 32 26 16 740 E=-4 4-1 4+1 4 K=(6 4 1,) SW(E1) -W5(B2) -B2XE3
B2*E3 1/12 2/33

J11 DEG=4 F=IAP AUT=2 P=(1,22,22,1) GIR=3 CN=4,4 ANTIPRISM
A=1 1 3 15,24 12 44 302 740 E=2-2.23607 4-1 0 2+2.23607 4 K=(3,3) SW(E2)
-D(J11) -D(J6) 1/6 2/43

TRANSITIVE GRAPHS ON 11 VERTICES

K1 DEG=0 F=XTVIAP AUT=3628800 P=(1,+) CN=1,11

K2 DEG=2 F=TVIP AUT=2 P=(1,2,2,2,2,2) GIR=11 CN=3,6 POLYGON
A=1 1 4 2,20 10 100 40 400,1200
E=2-1.91899 2-1.30972 2-.28463 2+.83083 2+1.68251 2 K=(21 20 5,) 1/10

K3 DEG=4 F=VI AUT=2 P=(1,22,22,2) GIR=3 CN=4,4
A=1 1 3 15,24 12 102 44 640,1700
E=2-2.20362 2-1.59435 2-.47889 2-.23648 2+2.51334 4 K=(6,3) D(K2) -D(K3) 1/24

K4 DEG=4 F=VI AUT=2 P=(1,22,222) GIR=4 CN=3,6
A=1 1 1 1,34 32 104 242 424,1212
E=2-3.22871 2-1.08816 2+.37279 2+.54620 2+1.39788 4 K=(9 4,) 1/5

TRANSITIVE GRAPHS ON 12 VERTICES

L1 DEG=0 F=XTVIAP AUT=39916800 P=(1,+) CN=1,12

L2 DEG=1 F=XTIP AUT=3840 P=(1,1,+) CN=2,6 T=1
A=1 0 4 0,20 0 100 0 400,0 2000

L3 DEG=2 F=XTIP AUT=2592 P=(1,2,+) GIR=3 CN=3,4
A=1 3 0 10,0 30 40 0 240,400 2400 2[F3] 4[C2] 1/20 2/20 3/400 4/40 5/10

L4 DEG=2 F=XTIP AUT=256 P=(1,2,1,+) GIR=4 CN=2,6
A=1 1 6 0,20 0 20 240 100,100 3000 3[D3] F2[B1] B2XF2 1/10 2/5 3/110 4/5 5/4

L5 DEG=2 F=XTIP AUT=24 P=(1,2,2,1,+) GIR=6 CN=2,6
A=1 1 4 2,30 0 100 0 400,1200 500 2[F4] B2*F3 B2*F4 C2*D2 1/4 2/10 3/102 5/2

L6 DEG=2 F=TIAP AUT=2 P=(1,2,2,2,2,2,1) GIR=12 CN=2,6 POLYGON
A=1 1 4 2,20 10 100 40 400,200 3000 E=-2 2-1.73205 2-1 2+0 2+1 2+1.73205 2
K=(28 35 15 1,) 1/2 3/120

L7 DEG=3 F=XTIP AUT=6912 P=(1,3,+) GIR=3 CN=4,3 T=2
A=1 3 7 0,20 0 60 260 100,1100 3100 3[D4] F2[B2] 1/11 2/7 3/34 4/7 5/21

L8 DEG=3 F=XTI AUT=864 P=(1,3,2,+) GIR=4 CN=2,6 T=3
A=1 1 1 16,16 0 100 100 100,1600 1600 2[F5] D2[C1] B2*F5 1/5 2/12 3/106 5/3

L9 DEG=3 F=XIP AUT=24 P=(1,12,2,+) GIR=3 CN=3,4
A=1 1 5 12,26 0 100 100 200,1500 1600 2[F6] W3(D2) B2XF3 C2XD2 1/21 2/21 3/401
5/11

L10 DEG=3 F=P AUT=2 P=(1,12,22,22) GIR=3 CN=3,4
A=1 1 5 10,4 2 102 240 120,440 3020 E=3-2 3-1 2+0 3+2 3 K=(18 10,1) W1(D4)
4/11

L11 DEG=3 AUT=4 P=(1,12,122,12) GIR=4 CN=2,6
A=1 1 1 14,10 4 2 2 620,540 340 E=-3 2-1.73205 3-1 3+1 2+1.73205 3
K=(19 15 5 1,) 3/124

TRANSITIVE GRAPHS ON 12 VERTICES (CONTD)

L12 DEG=3 F=I AUT=2 P=(1,12,22,22) GIR=4 CN=3,6
A=1 1 1 12,6 10 4 200 500,1240 520 E=2-2.73205 3-1 2+0 2+.73205 2+2 3
K=(19 16 5,) D(L6) 1/41 3/32

L13 DEG=3 F=IAP AUT=2 P=(1,12,22,12,1) GIR=4 CN=2,6 PRISM
A=1 1 1 6,12 10 4 300 220,140 3400 E=-3 2-2 -1 4+0 1 2+2 3 K=(19 16 5 1,)
B2XF4 B2*F6 2/14 3/122

L14 DEG=4 F=XTIP AUT=384 P=(1,4,1,+) GIR=3 CN=3,4 T=1
A=1 1 7 7,36 0 100 100 700,700 3600 2[F7] L(H5) -D(L26) F3[B1] 1/24 2/120
3/600 5/12

L15 DEG=4 AUT=4 P=(1,112,122,2) GIR=3 CN=4,3
A=1 1 5 15,6 20 110 42 442,1300 2700 E=4-2 2-.73205 3+0 2+2.73205 4 K=(10,3 1)
W2(C2) 3/56

L16 DEG=4 AUT=2 P=(1,22,1222) GIR=3 CN=3,4
A=1 1 1 11,6 24 12 60 450,702 1304 E=3-2.56155 3-1 2+1 3+1.56155 4 K=(12 4,1)
4/103

L17 DEG=4 F=I AUT=2 P=(1,22,122,2) GIR=4 CN=2,6
A=1 1 1 1,6 34 32 22 14,1540 1640 E=-4 2-1.73205 2-1 2+0 2+1 2+1.73205 4
K=(13 10 5 1,) 1/50 3/47

L18 DEG=4 F=I AUT=4 P=(1,22,14,2) GIR=3 CN=3,4
A=1 1 1 11,6 24 22 114 212,1440 2340 E=2-3 4-1 0 2+1 2+2 4 K=(12 6,1)
-D(L21) B2XF6 C2XD3 1/30 2/25 3/501 5/14

L19 DEG=4 F=I AUT=12 P=(1,13,23,2) GIR=4 CN=2,6
A=1 1 1 1,34 34 12 22 6,1700 1640 E=-4 -2 4-1 4+1 2 4 K=(13 10 5 1,) B2XF5
2/16 3/214

L20 DEG=4 F=IAP AUT=4 P=(1,4,24,1) GIR=3 CN=3,4 T=1 CUBOCTAHEDRON
A=1 1 5 3,30 6 50 304 60,1102 3600 E=5-2 3+0 3+2 4 K=(11 3,2) L(H7) -D(L10)
4/50

L21 DEG=4 F=IP AUT=2 P=(1,22,22,12) GIR=3 CN=3,4 ANTIPRISM
A=1 1 3 15,12 24 104 42 600,1440 3300 E=4-2 2-.73205 3+0 2+2.73205 4
K=(10 1,3) -D(L12) 1/44 3/205

L22 DEG=4 F=IA AUT=2 P=(1,22,222,1) GIR=3 CN=3,4
A=1 1 1 11,24 12 4 202 454,322 740 E=2-2.73205 2-2 3+0 2+.73205 2+2 4
K=(12 5,1) 1/22 3/403

L23 DEG=4 F=I AUT=64 P=(1,4,14,2) GIR=4 CN=2,6 T=1
A=1 1 1 1,36 30 30 6 6,1700 1700 E=-4 2-2 6+0 2+2 4 K=(13 11 5 1,) F4[B1]
B2*F7 C2*D3 1/42 2/110 3/221 5/24

L24 DEG=4 F=I AUT=4 P=(1,22,124) GIR=4 CN=3,6
A=1 1 1 1,6 60 50 224 222,1114 512 E=2-3 2-2 0 6+1 4 K=(13 6,) D(L13) 1/14
2/43 3/132 5/42

L25 DEG=5 F=XTI AUT=86400 P=(1,5,+) GIR=3 CN=6,2 T=2
A=1 3 7 17,37 0 100 300 700,1700 3700 2[F8] SW(F3) SW(F8) D2[C2] F3[B2] 1/25
2/121 3/610 5/13

L26 DEG=5 F=I AUT=64 P=(1,14,4,2) GIR=3 CN=4,3
A=1 3 7 3,23 60 160 14 414,1700 3700 E=-3 8-1 2+3 5 K=(4,6 2) SW(F2) SW(F4)
-D(L18) -D(L35) F4[B2] 1/43 2/114 3/245 5/61

L27 DEG=5 AUT=1 P=(1/5/6) GIR=3 CN=3,4
A=1 1 1 15,11 50 66 306 412,1160 3106 E=-3 2-2.73205 2-1 2+0 2+.73205 2+2 5
K=(7 1,3) 3/225

L28 DEG=5 F=I AUT=2 P=(1,122,222) GIR=3 CN=3,4
A=1 1 5 1,1 50 124 252 526,272 166 E=2-3.73205 2-1 2-.26795 5+1 5 K=(9 4,1)
D(L22) 1/61 3/413

L29 DEG=5 F=I AUT=2 P=(1,122,222) GIR=3 CN=4,3
A=1 3 7 1,1 22 42 170 264,1350 724 E=-3 2-2.73205 2-1 2+0 2+.73205 2+2 5
K=(7,3 1) 1/13 3/174

TRANSITIVE GRAPHS ON 12 VERTICES (CONTD)

L30 DEG=5 F=I AUT=12 P=(1,23,6) GIR=3 CN=4,3
A=1 3 1 11,31 44 12 314 222,1524 1342 E=6-2 3+1 2+2 5 K=(6,4 1) C2XD4 -C2*D4
1/31 2/27 3/434 4/17 5/31

L31 DEG=5 AUT=1 P=(1/5/6) GIR=3 CN=3,4
A=1 1 1 15,15 74 42 210 702,622 3406 E=2-2.73205 2-2 -1 2+0 2+.73205 1 3 5
K=(6 1,4) 3/503

L32 DEG=5 F=I AUT=4 P=(1,122,24) GIR=3 CN=4,3
A=1 1 1 3,23 16 16 250 144,1630 1524 E=2-3 2-2 4+0 1 2+2 5 K=(7,3 1) 1/15
2/17 3/311 5/23

L33 DEG=5 F=I AUT=4 P=(1,14,24) GIR=3 CN=4,4
A=1 1 1 11,5 50 124 262 162,1216 516 E=3-3 2-1 6+1 5 K=(8 2,2) -L(F7) D(L20)
4/111

L34 DEG=5 F=TIA AUT=120 P=(1,5,5,1) GIR=4 CN=2,6 T=2
A=1 1 1 1,1 74 72 66 56,36 3700 E=-5 5-1 5+1 5 K=(10 10 5 1,) SW(F1) SW(F5)
-W6(B2) -B2XF8 B2*F8 2/111 3/163

L35 DEG=5 F=IA AUT=8 P=(1,14,14,1) GIR=3 CN=3,4
A=1 1 1 15,15 74 42 206 212,1422 3700 E=2-3 5-1 3+1 3 5 K=(6 2,4) SW(F6)
SW(F7) -D(L15) B2XF7 2/124 3/416

L36 DEG=5 F=I AUT=2 P=(1,122,222) GIR=3 CN=4,4
A=1 1 1 5,31 50 124 216 116,642 3122 E=2-3 2-1.73205 2-1 3+1 2+1.73205 5
K=(7,3) 1/7 3/350

L37 DEG=5 F=TIAP AUT=10 P=(1,5,5,1) GIR=3 CN=4,4 T=1 ICOSAHEDRON
A=1 3 5 3,31 50 114 22 560,606 3700 E=3-2.23607 5-1 3+2.23607 5 K=(5,5)
SW(E2+) -D(L37) 4/121

TRANSITIVE GRAPHS ON 13 VERTICES

M1 DEG=0 F=XTVIAP AUT=479001600 P=(1,+) CN=1,13

M2 DEG=2 F=TVIP AUT=2 P=(1,2,2,2,2,2,2) GIR=13 CN=3,7 POLYGON
A=1 1 4 2,20 10 100 40 400,200 2000 5000
E=2-1.94188 2-1.49702 2-.70921 2+.24107 2+1.13613 2+1.77091 2 K=(36 56 35 6,)
1/1

M3 DEG=4 F=VI AUT=4 P=(1,4,44) GIR=4 CN=4,7 T=1
A=1 1 1 1,20 10 142 144 54,1122 224 4412 E=4-2.65109 4+.27389 4+1.37720 4
K=(18 12,) 1/6

M4 DEG=4 F=VI AUT=2 P=(1,22,22,22) GIR=3 CN=4,5
A=1 1 3 15,24 12 44 102 400,1200 3500 3240
E=2-2.20623 2-1.70081 2-1.25595 2-.17097 2+.42692 2+2.90704 4 K=(15 4,3)
D(M2) 1/44

M5 DEG=4 F=VI AUT=2 P=(1,22,222,2) GIR=4 CN=3,7
A=1 1 1 1,34 32 4 202 414,222 2500 5240
E=2-3.43891 2-.80575 2-.46814 2-.36089 2+1.06170 2+2.01199 4 K=(18 16 5,)
-D(M4) 1/5

M6 DEG=6 F=TVIS AUT=6 P=(1,6,6) GIR=3 CN=5,5 T=1
A=1 3 1 15,11 43 124 312 432,654 3046 5360 E=6-2.30278 6+1.30278 6 K=(6,6)
1/15

M7 DEG=6 F=VIS AUT=2 P=(1,222,222) GIR=3 CN=5,5
A=1 3 3 15,5 3 132 74 244,1502 3350 3560
E=2-3.19783 2-1.96516 2-1.07010 2+.07010 2+.96516 2+2.19783 6 K=(6,6) 1/64

M8 DEG=6 F=VI AUT=2 P=(1,222,222) GIR=3 CN=4,5
A=1 3 5 3,1 1 174 172 164,1152 2524 5252
E=2-4.14811 2-.88018 2-.56468 2+.51496 2+.66799 2+1.41002 6 K=(9 4,3) -M9
D(M5) 1/16

M9 DEG=6 F=VI AUT=2 P=(1,222,222) GIR=3 CN=5,4
A=1 1 3 5,33 75 124 52 412,1224 3604 7602
E=2-2.41002 2-1.66799 2-1.51496 2-.43532 2-.11982 2+3.14811 6 K=(3,9 4) -M8
-D(M5) 1/52

```
  TRANSITIVE GRAPHS ON 14 VERTICES

N1  DEG=0 F=XTVIAP AUT=6227020800  P=(1,+)  CN=1,14

N2  DEG=1 F=XTIP AUT=46080  P=(1,1,+)  CN=2,7  T=1
A=1 0 4 0,20 0 100 0 400,0 2000 0 10000

N3  DEG=2 F=XTIP AUT=28  P=(1,2,2,2,+)  GIR=7 CN=3,8
A=1 1 4 2,20 50 0 200 0,0 2400 1200 3000  2[G2] 1/20 2/200

N4  DEG=2 F=TIAP AUT=2  P=(1,2,2,2,2,2,2,1)  GIR=14 CN=2,7  POLYGON
A=1 1 4 2,20 10 100 40 400,200 2000 1000 14000
E=-2 2-1.80194 2-1.24698 2-.44504 2+.44504 2+1.24698 2+1.80194 2
K=(45 84 70 21 1,)  B2*G2 1/2 2/140

N5  DEG=3 F=I AUT=2  P=(1,12,22,22,2)  GIR=4 CN=2,7
A=1 1 1 12,6 10 4 200 100,240 120 3400 5400
E=-3 2-2.24698 2-.80194 2-.55496 2+.55496 2+.80194 2+2.24698 3
K=(33 44 25 6 1,)  D(N4) 1/11 2/7

N6  DEG=3 F=IP AUT=2  P=(1,12,22,22,2)  GIR=4 CN=3,7  PRISM
A=1 1 1 12,6 10 4 200 500,240 120 5000 12400
E=2-2.80194 2-1.44504 2-.80194 2+.24698 2+.55496 1 2+2.24698 3  K=(33 44 25 6,)
B2XG2 1/5 2/201

N7  DEG=3 F=TI AUT=24  P=(1,3,6,4)  GIR=6 CN=2,7  T=4  HEAWOOD GRAPH
A=1 1 1 10,2 2 4 4 10,1240 1500 460 320  E=-3 6-1.41421 6+1.41421 3
K=(33 42 20 6 1,)  2/144

N8  DEG=4 F=XI AUT=28  P=(1,22,2,+)  GIR=3 CN=4,6
A=1 3 5 3,34 72 0 200 200,400 3400 3600 7200  2[G3] 1/104 2/1200

N9  DEG=4 F=IAP AUT=2  P=(1,22,22,22,1)  GIR=3 CN=4,5  ANTIPRISM
A=1 1 3 15,24 12 44 102 500,240 1400 6200 17000
E=2-2.24698 2-1.69202 2-1.35690 2-.55496 0 2+.80194 2+3.04892 4  K=(21 10,3)
1/60 2/504

N10  DEG=4 F=I AUT=2  P=(1,22,222,12)  GIR=4 CN=2,7
A=1 1 1 1,32 34 14 22 2,4 3600 3300 3440
E=-4 2-2.24698 2-.80194 2-.55496 2+.55496 2+.80194 2+2.24698 4
K=(24 26 15 6 1,)  B2*G3 1/12 2/164

N11  DEG=4 F=IA AUT=2  P=(1,22,2222,1)  GIR=4 CN=3,7
A=1 1 1 1,24 12 4 2 414,1222 450 4320 740
E=2-3.04892 2-2.24698 2-.55496 0 2+.80194 2+1.35690 2+1.69202 4  K=(24 22 5,)
1/22 2/214

N12  DEG=4 F=I AUT=128  P=(1,4,14,4)  GIR=4 CN=3,7  T=1
A=1 1 1 1,36 30 6 6 30,600 3100 4600 13100  E=2-3.60388 2-.89008 7+0 2+2.49396 4
K=(24 28 15 3,)  -D(N14) G2[B1] 1/30 2/1005

N13  DEG=4 F=TI AUT=24  P=(1,4,6,3)  GIR=4 CN=2,7  T=2  DUAL OF HEAWOOD
A=1 1 1 1,30 24 14 12 6,22 2700 3240 1540  E=-4 6-1.41421 6+1.41421 4
K=(24 24 15 6 1,)  2/154

N14  DEG=5 F=I AUT=128  P=(1,14,4,4)  GIR=3 CN=5,4
A=1 3 7 3,23 14 60 114 260,1200 2500 7200 16500
E=2-2.60388 7-1 2+.10992 2+3.49396 5  K=(12,6 2)  -D(N12) G2[B2] 1/31 2/207

N15  DEG=5 F=I AUT=2  P=(1,122,2222)  GIR=3 CN=4,5
A=1 1 5 5,11 50 24 242 122,1006 2412 3340 4720
E=2-2.69202 2-2.35690 2-1.24698 -1 2+.44504 2+1.80194 2+2.04892 5  K=(15 4,3)
D(N6) D(N9) 1/61 2/1114

N16  DEG=5 F=A AUT=1  P=(1/5/7/1)  GIR=3 CN=4,5
A=1 1 1 11,15 60 6 202 530,406 710 2066 7300
E=2-3.21615 2-1.85926 -1 2-.38772 2-.16723 2+.96917 2+2.66119 5  K=(15 8,3)
2/226

N17  DEG=5 F=I AUT=2  P=(1,122,222,2)  GIR=3 CN=4,5
A=1 1 5 11,5 70 164 12 406,1042 422 7200 16500
E=2-3.24698 2-1.55496 2-1.24698 2-.19806 2+.44504 2+1.80194 3 5  K=(15 8,3)
B2XG3 1/105 2/1201

N18  DEG=5 F=I AUT=2  P=(1,122,2222)  GIR=4 CN=3,7
A=1 1 1 1,1 66 72 52 26,1110 2604 5050 12424
E=2-4.04892 2-1.24698 -1 2+.35690 2+.44504 2+.69202 2+1.80194 5  K=(18 16 5,)
D(N11) D(N5) 1/23 2/541
```

TRANSITIVE GRAPHS ON 14 VERTICES (CONTD)

N19 DEG=5 F=I AUT=2 P=(1,122,222,2) GIR=4 CN=2,7
A=1 1 1 1,1 72 66 54 34,26 52 7500 7600
E=-5 2-1.80194 2-1.24698 2-.44504 2+.44504 2+1.24698 2+1.80194 5
K=(18 20 15 6 1,) 1/13 2/172

N20 DEG=6 F=XTI AUT=3628800 P=(1,6,+) GIR=3 CN=7,2 T=2
A=1 3 7 17,37 77 0 200 600,1600 3600 7600 17600 2[G4] SW(G4) 1/124 2/1600

N21 DEG=6 AUT=1 P=(1/6/7) GIR=3 CN=5,4
A=1 1 1 11,5 75 70 46 422,630 1456 3302 13206
E=2-3.21615 -2 2-1.85926 2-.38772 2-.16723 2+.96917 2+2.66119 6 K=(9,6 2)
2/233

N22 DEG=6 F=I AUT=2 P=(1,222,1222) GIR=3 CN=4,5
A=1 3 1 1,5 3 170 164 552,1224 2612 4134 12072
E=2-4.04892 2-1.80194 2-.44504 2+.35690 2+.69202 2+1.24698 2 6 K=(12 6,3)
1/122 2/1206

N23 DEG=6 F=I AUT=2 P=(1,222,1222) GIR=3 CN=4,5
A=1 3 5 3,1 1 170 164 152,1304 2642 5134 2472
E=2-4.04892 -2 2-1.24698 2+.35690 2+.44504 2+.69202 2+1.80194 6 K=(12 6,3)
D(N16) 1/46 2/1017

N24 DEG=6 F=TIA AUT=720 P=(1,6,6,1) GIR=4 CN=2,7 T=2
A=1 1 1 1,1 1 174 172 166,156 136 76 17600 E=-6 6-1 6+1 6 K=(15 20 15 6 1,)
SW(G1) -W7(B2) -B2XG4 B2*G4 1/52 2/173

N25 DEG=6 F=I AUT=2 P=(1,222,1222) GIR=3 CN=4,5
A=1 3 1 11,15 23 36 214 222,544 3142 5450 13520
E=2-2.69202 2-2.35690 2-1.80194 2-.44504 2+1.24698 2 2+2.04892 6 K=(9 2,6)
1/106 2/1203

N26 DEG=6 F=I AUT=2 P=(1,222,1222) GIR=3 CN=4,5
A=1 1 3 5,15 23 36 214 222,544 3142 5450 13520
E=2-2.69202 2-2.35690 -2 2-1.24698 2+.44504 2+1.80194 2+2.04892 6 K=(9 2,6)
1/54 2/570

N27 DEG=6 F=IA AUT=2 P=(1,222,222,1) GIR=3 CN=4,5
A=1 3 3 15,5 3 132 74 144,1142 2310 5460 17600
E=2-3.49396 6-1 2-.10992 2 2+2.60388 6 K=(9 4,6) SW(G3) -D(N28) 1/160 2/1214

N28 DEG=6 F=IA AUT=2 P=(1,222,222,1) GIR=3 CN=5,4
A=1 1 3 5,33 75 124 52 412,224 3204 7402 17600
E=2-2.60388 -2 6-1 2+.10992 2+3.49396 6 K=(6,9 4) SW(G2) -D(N17) -D(N27) 1/16
2/1055

TRANSITIVE GRAPHS ON 15 VERTICES

01 DEG=0 F=XTVIAP P=(1,+) CN=1,15

02 DEG=2 F=XTIP AUT=62208 P=(1,2,+) GIR=3 CN=3,5
A=1 3 0 10,0 30 40 0 240,400 0 2400 4000 24000 5[C2] 1/20

03 DEG=2 F=XTIP AUT=400 P=(1,2,2,+) GIR=5 CN=3,9
A=1 1 4 12,0 40 0 0 500,440 200 0 14000 10200 3[E2] 1/40

04 DEG=2 F=TIP AUT=2 P=(1,2,2,2,2,2,2,2) GIR=15 CN=3,8 POLYGON
A=1 1 4 2,20 10 100 40 400,200 2000 1000 10000 24000
E=2-1.95630 2-1.61803 2-1 2-.20906 2+.61803 2+1.33826 2+1.82709 2
K=(55 120 126 56 7,) 1/2

05 DEG=4 F=XTI AUT=691200 P=(1,4,+) GIR=3 CN=5,3 T=2
A=1 3 7 17,0 40 0 140 540,1540 200 4200 14200 34200 3[E3] 1/44

06 DEG=4 F=I AUT=4 P=(1,22,24,4) GIR=3 CN=3,5
A=1 1 1 11,4 42 24 22 214,412 500 1040 14240 16100
E=4-2.61803 4-.38197 2+.38197 2+1 2+2.61803 4 K=(30 32 10,1) C2XE2 1/60

07 DEG=4 F=NTIA AUT=8 P=(1,4,8,2) GIR=3 CN=4,6 T=1
A=1 3 1 11,20 4 110 144 2,210 1060 3002 5300 12440 E=5-2 4-1 5+2 4
K=(29 24 2,2) L(J7)

TRANSITIVE GRAPHS ON 15 VERTICES (CONTD)

```
08  DEG=4 F=I AUT=2  P=(1,22,22,22,2)  GIR=3 CN=3,5
A=1 1 3 15,24 12 44 102 400,200 1500 2240 7000 33000
E=2-2.16535 2-2 4-1 2-.12920 2+1.12920 2+3.16535 4  K=(28 20 1,3)  D(04) 1/12

09  DEG=4 F=I AUT=2  P=(1,22,2222,2)  GIR=4 CN=3,8
A=1 1 1 1,24 12 4 2 414,1222 410 4220 10540 4340
E=2-3.23607 2-1.82709 2-1.33826 2+.20906 2+1 2+1.23607 2+1.95630 4
K=(31 36 15 2,)  1/104

010  DEG=4 F=I AUT=2  P=(1,22,222,22)  GIR=3 CN=3,5
A=1 1 1 11,24 12 54 122 2,4 3040 3100 11400 26200
E=2-2.95630 2-2 2-1.20906 2+.33826 2+.38197 2+.82709 2+2.61803 4  K=(30 32 11,1)
1/22

011  DEG=4 F=I AUT=2  P=(1,22,222,22)  GIR=4 CN=3,8
A=1 1 1 1,34 32 4 202 14,22 2400 5200 12500 5240
E=2-3.57433 4-1 2-.27977 2+.40898 2+1 2+2.44512 4  K=(31 40 25 6,)  1/140

012  DEG=4 F=I AUT=4  P=(1,4,224,2)  GIR=4 CN=3,8  T=1
A=1 1 1 1,24 12 30 6 120,50 1042 2104 6600 11600
E=2-3.23607 2-2 4-.61803 2+1.23607 4+1.61803 4  K=(31 36 16 2,)  C2*E2 1/11

013  DEG=6 F=I AUT=2  P=(1,222,2222)  GIR=3 CN=5,3
A=1 3 7 17,1 1 50 320 344,542 2510 1260 16504 15242
E=2-2.95630 2-2.61803 2-1.20906 2-.38197 2+.33826 2+.82709 2+3 6  K=(13,6 4 1)
1Fj44

014  DEG=6 F=I AUT=2  P=(1,222,2222)  GIR=3 CN=3,5
A=1 3 5 3,1 41 134 72 104,42 3464 3312 3260 23510
E=2-3.16535 2-3 2-1.12920 2+.12920 4+1 2+2.16535 6  K=(15 8 1,4)  1/121

015  DEG=6 F=I AUT=2  P=(1,222,2222)  GIR=3 CN=4,5
A=1 3 1 1,5 3 72 334 64,1112 2224 1412 16160 15150
E=2-3.78339 2-2.61803 2-.38197 2+0 2+.48883 2+1.54732 2+1.74724 6  K=(16 8,3)
1/16

016  DEG=6 F=I AUT=4  P=(1,24,224)  GIR=3 CN=3,5
A=1 3 5 13,5 43 146 36 30,140 3300 3420 17410 17240
E=2-3 4-1.61803 2-1.23607 4+.61803 2+3.23607 6  K=(12 4 1,7)  1/122

017  DEG=6 F=I AUT=2  P=(1,222,222,2)  GIR=3 CN=5,4
A=1 1 3 5,33 75 124 52 204,1402 2412 1224 17200 37400
E=2-2.61803 2-1.74724 2-1.54732 2-.48883 2-.38197 2+0 2+3.78339 6  K=(10,9 4)
-D(010) -D(011) 1/52

018  DEG=6 F=I AUT=2  P=(1,222,2222)  GIR=3 CN=4,5
A=1 1 3 5,23 55 164 152 204,402 3220 7410 13012 27024
E=2-2.82709 2-2.33826 2-1.23607 2-.79094 2+0 2+.95630 2+3.23607 6  K=(12 4,7)
-D(017) 1/124

019  DEG=6 F=I AUT=2  P=(1,222,2222)  GIR=3 CN=3,5
A=1 1 1 11,23 55 134 72 42,104 3404 7202 13214 7422
E=2-3 2-2.61803 2-.82709 2-.38197 2-.33826 2+1.20906 2+2.95630 6  K=(13 4 1,6)
D(08) 1/13

020  DEG=6 F=I AUT=48  P=(1,24,8)  GIR=3 CN=5,3
A=1 3 1 11,31 71 104 12 614,422 3224 2442 15244 12702  E=8-2 4+1 2+3 6
K=(12,7 4 1)  C2XE3 -C2*E3 1/64

021  DEG=6 F=NTVI AUT=48  P=(1,6,8)  GIR=3 CN=4,5  T=1
A=1 3 1 1,21 11 124 142 654,54 2342 2524 15032 2632  E=5-3 9+1 6  K=(16 8 2,3)
-L(F8) D(07)

022  DEG=6 F=I AUT=2  P=(1,222,2222)  GIR=3 CN=3,5
A=1 3 1 1,1 1 174 172 424,1212 2124 5052 12164 5152
E=2-4.57433 2-1.27977 2-.59102 2+0 4+1 2+1.44512 6  K=(18 16 5,1)  1/62

023  DEG=6 F=I AUT=5184  P=(1,6,26)  GIR=4 CN=3,8  T=1
A=1 1 1 1,1 1 176 176 160,1016 1016 1016 16160 16160
E=2-4.85410 10+0 2+1.85410 6  K=(19 20 10 2,)  D(012) D(09) E2[C1] 1/51

024  DEG=6 F=I AUT=4  P=(1,24,224)  GIR=3 CN=4,6
A=1 1 5 13,5 43 2 204 740,630 1262 1514 6464 12312
E=2-2.61803 4-2.23607 2-.38197 2+0 4+2.23607 6  K=(13 4,6)  -D(06) 1/15
```

5. Additional Information. (a) Two graphs are *cospectral* if their adjacency matrices have the same eigenvalues and multiplicities. We list here all families of cospectral graphs in the catalogue. The complements of each member of a family form another family.

12 vertices:	L15	L21	L27	L29.					
16 vertices:	P33	P49,	P35	P45,	P61	P88,	P63	P72,	
	P64	P86,	P75	P91,	P78	P95,	P81	P84,	
	P97	P107,	P98	P134,	P99	P113	P118,	P103	P108,
	P105	P141,	P111	P112,	P120	P136,	P124	P137,	
	P142	P143.							

(b) The following graphs are the only ones in the catalogue which are not Cayley graphs:

J7, O7, O21, P20, P52, P93, P110, R38, R147.

(c) The switching classes of transitive graphs of even order are shown in Table 3. It is easy to show that X and Y are switching equivalent if and only if $\overline{X}$ and $\overline{Y}$ are. Thus each family in Table 3 provides another by complementing each member. However the following graphs are actually switching equivalent to their own complements:

B1, J3, J6, J7, R15, R32, R38, R39, R147, R148, R161, R179.

Table 3 does not include the following graphs, as they are unique in their switching classes: L10, L16, L37, P74 and P139. It may be worth noticing that each family of cospectral graphs is related also by switching. In fact, two switching equivalent regular graphs of the same degree are necessarily cospectral.

(d) The self-complementary transitive graphs in the catalogue are E2, I4, M6, M7, Q14, Q15, Q18 and Q20.

(e) The connected planar transitive graphs (excluding polygons) with order less than 20 are D4, F6, F7, H7, H10, J6, J11, L10, L13, L20, L21, L37, N6, N9, P10, P16, R10 and R20.

(f) The distance-regular connected graphs in the catalogue, excluding polygons and those with $d > (n-1)/2$, are H7, I4, J7, J10, L34, L37, M6, N7, N13, N24, O7, O21, P27, P55, P81, P84, P130, Q18, R11 and R173. Of these, only P84 is not distance-transitive.

(g) $\mathrm{Aut}(X)$ will act primitively on $V(X)$ if n is prime or if X has no edges. Excluding complements, the only other examples in the catalogue where this occurs are for I4, J7, O21, P55 and P81.

(h) The following are all those graphs in the catalogue whose arc-transitivity is at least one. We exclude disconnected graphs, polygons, and those whose complements are a disjoint union of complete graphs.

H7, I4, J7, J9, J10, $\overline{\text{J7}}$, L20, L23, L34, L37, $\overline{\text{L30}}$, M3, M6,
N7, N12, N13, N24, O7, O12, O21, O23, $\overline{\text{O20}}$, $\overline{\text{O21}}$, P12, P23, P27,
P55, P81, P82, P84, P130, $\overline{\text{P55}}$, $\overline{\text{P81}}$, Q3, Q18, R11, R28, R29,
R88, R90, R171, R173, $\overline{\text{R126}}$, S14.

(i) The only connected graph in the catalogue which has no Hamiltonian cycle is Petersen's graph (J7), which has Hamiltonian paths and cycles of length 9.

```
B1    -B1 .
D1    -D2 .
F1    -F3  ,  F2     F4 .
H1    -H5  ,  H2    -H3     H7  ,  H4    -H6 .
J1    -J8  ,  J2     J10 ,  J3    -J3  ,  J4     J5  ,
J6    -J6  ,  J7    -J7  ,  J9    -J11 .
L1    -L25 ,  L2    -L14    L34 ,  L3    -L8  ,  L4     L23   -L35 ,
L5    -L9     L19 ,  L6     L17   -L31 ,  L7     L26 ,
L11   -L22    L36 ,  L12    L27    L29 ,  L13   -L18   L32 ,
L15    L21   -L28 ,  L20   -L33 ,  L24   -L30 .
N1    -N20 ,  N2     N24 ,  N3    -N8  ,  N4     N19 ,  N5     N10 ,
N6    -N17 ,  N7     N13 ,  N9    -N22 ,  N11   -N25 ,  N12   -N27 ,
N14    N28 ,  N15    N26 ,  N16    N21 ,  N18    N23 .
P1    -P96 ,  P2    -P56    P130,  P3    -P29    P82   -P132,
P4    -P30    P87   -P116,  P5     P69   -P114,  P6    -P13    P109,
P7    -P14    P48   -P89    P140,  P8    -P15   -P76    P133,
P9    -P62    P127,  P10    P40   -P63   -P72    P105   P141,
P11    P37   -P64   -P86    P124   P137,
P12    P39   -P71    P106,  P16    P83   -P131,
P17   -P32   -P125,  P18    P80   -P101,  P19   -P123,
P20   -P52    P93   -P110,  P21   -P33   -P49    P57   -P103  -P108,
P22   -P53    P61    P88   -P120  -P136,  P23   -P111  -P112,
P24   -P35   -P45    P78    P95   -P99   -P113  -P118,
P25   -P47    P90   -P121,  P26   -P41    P68 ,
P27   -P44    P94   -P97   -P107,  P28   -P54    P58   -P104,
P31   -P70    P138,  P34    P128,  P36   -P85    P102,
P38    P100,  P42   -P66    P117,  P43   -P67    P98    P134,
P46   -P59    P142   P143,  P50   -P75   -P91    P129,
P51   -P65 ,  P55   -P81   -P84 ,  P60   -P135,  P73   -P122,
P77   -P115,  P79   -P119,  P92   -P126 .
R1    -R137,  R2     R173,  R3    -R54 ,  R4     R113,  R5    -R55 ,
R6     R130,  R7     R90 ,  R8    -R132,  R9     R85 ,  R10   -R111,
R11    R88 ,  R12   -R103,  R13    R80 ,  R14   -R172,  R15   -R15 ,
R16   -R17 ,  R18    R33 ,  R19    R37 ,  R20   -R153,  R21   -R166,
R22    R49 ,  R23   -R141,  R24    R40 ,  R25   -R151,  R26   -R165,
R27   -R156,  R28   -R158,  R29    R48 ,  R30    R139,  R31    R180,
R32   -R32 ,  R34    R178,  R35   -R36 ,  R38   -R38 ,  R39   -R39 ,
R41    R159,  R42    R157,  R43    R140,  R44    R167,  R45    R182,
R46    R144,  R47    R189,  R50    R154,  R51    R187,  R52    R168,
R53    R181,  R56    R93 ,  R57    R94 ,  R58    R109,  R59   -R74 ,
R60    R114,  R61    R110,  R62   -R83 ,  R63   -R84 ,  R64    R96 ,
R65   -R86 ,  R66    R119,  R67    R107,  R68    R106,  R69   -R75 ,
R70    R102,  R71   -R76 ,  R72    R124,  R73    R133,  R77    R95 ,
R78    R121,  R79    R108,  R81    R127,  R82    R131,  R87    R116,
R89    R97 ,  R91    R128,  R92   -R136,  R98   -R120,  R99   -R125,
R100  -R117,  R101  -R104,  R105  -R115,  R112  -R123,  R118  -R129,
R122  -R134,  R126  -R135,  R138  -R142,  R143  -R150,  R145  -R149,
R146  -R163,  R147  -R147,  R148  -R148,  R152  -R174,  R155  -R160,
R161  -R161,  R162  -R170,  R164  -R183,  R169  -R184,  R171  -R186,
R175  -R190,  R176  -R177,  R179  -R179,  R185  -R188 .
```

TABLE 3. *Switching classes of transitive graphs* ($-X$ *is the complement of* X)

Department of Mathematics
University of Melbourne
Parkville, Victoria 3052, Australia

1. M. BEHZAD & G. CHARTRAND, *Introduction to the Theory of Graphs*, Allyn and Bacon, Boston, Mass., 1971.

2. N. BIGGS, *Algebraic Graph Theory*, Cambridge Tracts in Mathematics No. 67, Cambridge, 1974.

3. C. GODSIL, *Neighbourhoods of Transitive Graphs and* GRR's, Mathematics Research Report No. 2, University of Melbourne, 1977.

4. J. J. SEIDEL, "Graphs and two-graphs," *Proc. 5th Southeastern Conf. on Combinatorics, Graph Theory and Computing*, Utilitas Math., Winnipeg, 1974.

5. H. P. YAP, "Point symmetric graphs with $p \leqslant 13$ points," *Nanta Math.*, v. 6, 1973, pp. 8–20.

Brendan D. McKay, Transitive Graphs With Fewer Than Twenty Vertices, p. 101.

TRANSITIVE GRAPHS ON 16 VERTICES

P1 DEG=0 F=XTVIAP P=(1,+) CN=1,16

P2 DEG=1 F=XTIP AUT=645120 P=(1,1,+) CN=2,8 T=1
A=1 0 4 0,20 0 100 0 400,0 2000 0 10000 0,40000

P3 DEG=2 F=XTIP AUT=6144 P=(1,2,1,+) GIR=4 CN=2,8
A=1 1 6 0,20 0 20 240 100,0 100 5000 2000 2000,60000 2[H3] 4[D3] H2[B1] B2xH2
D2xD2 B2*H3 D2*D3 1/20 2/3 3/3 4/30 5/24000 6/1200 7/3 8/42 9/30 10/3 11/3
12/240 13/5 14/4

P4 DEG=2 F=XTIP AUT=32 P=(1,2,2,2,1,+) GIR=8 CN=2,8
A=1 1 4 2,20 10 140 0 400,0 0 2000 5000 2400,14000 2[H4] B2*H4 1/100 2/400
6/1001 8/24 11/200 12/102 13/1000 14/100

P5 DEG=2 F=TIAP AUT=2 P=(1,2,2,2,2,2,2,1) GIR=16 CN=2,8 POLYGON
A=1 1 4 2,20 10 100 40 400,200 2000 1000 10000 4000,60000
E=-2 2-1.84776 2-1.41421 2-.76537 2+0 2+.76537 2+1.41421 2+1.84776 2
K=(66 165 210 126 28 1,) 1/10 12/210

P6 DEG=3 F=XTIP AUT=497664 P=(1,3,+) GIR=3 CN=4,4 T=2
A=1 3 7 0,20 0 60 260 100,0 1100 5100 2000 22000,62000 2[H5] 4[D4] H2[B2] 1/21
2/22 3/22 4/1004 5/60001 6/10004 7/22 8/1002 9/1002 10/22 11/24 12/2040 13/120
14/5

P7 DEG=3 F=XTIP AUT=288 P=(1,3,3,1,+) GIR=4 CN=2,8 T=2
A=1 1 1 14,12 6 160 0 400,0 2000 5000 2400 25000,12400 2[H7] B2xH3 D2xD3 B2*H5
B2*H7 D2*D4 2/201 3/12 4/402 5/441 6/1024 7/11 8/404 9/300 10/12 11/402 12/106
13/16

P8 DEG=3 F=XI AUT=32 P=(1,12,22,+) GIR=4 CN=3,8
A=1 1 1 12,6 50 124 0 400,0 400 1000 16000 12400,7000 2[H6] 1/101 2/42 6/2024
8/43 11/14 12/4040 13/60 14/101

TRANSITIVE GRAPHS ON 16 VERTICES (CONTD)

P9 DEG=3 F=I AUT=2 P=(1,12,22,22,22) GIR=4 CN=3,8
A=1 1 1 12,6 10 4 240 120,200 100 5000 2400 24000,52000
E=2-2.84776 2-1.76537 -1 2-.41421 2-.23463 2+.84776 2+1 2+2.41421 3
K=(51 96 85 36 7,) D(P5) 1/11 12/54

P10 DEG=3 F=IAP AUT=2 P=(1,12,22,22,12,1) GIR=4 CN=2,8 PRISM
A=1 1 1 12,6 10 4 200 100,240 120 1400 5000 2400,70000
E=-3 2-2.41421 3-1 2-.41421 2+.41421 3+1 2+2.41421 3 K=(51 96 85 36 7 1,)
B2XH4 B2*H6 2/11 6/1042 12/301

P11 DEG=3 AUT=8 P=(1,12,122,122,2) GIR=4 CN=2,8
A=1 1 1 14,2 2 10 4 160,100 40 600 600 26000,16000
E=-3 2-2.23607 5-1 5+1 2+2.23607 3 K=(51 95 80 33 7 1,) 6/2011 9/440 12/114
13/404

P12 DEG=3 F=IA AUT=6 P=(1,3,6,23,1) GIR=6 CN=2,8 T=2
A=1 1 1 10,10 4 2 4 2,620 1140 300 440 1020,70000
E=-3 4-1.73205 3-1 3+1 4+1.73205 3 K=(51 94 75 27 7 1,) 8/105 11/102 12/412
13/1001

P13 DEG=4 F=XTI AUT=165888 P=(1,4,3,+) GIR=4 CN=2,8 T=3
A=1 1 1 1,36 36 36 0 400,400 400 400 17000 17000,17000 2[H8] D2[D1] H3[B1]
B2*H8 D3*D3 1/104 2/205 3/140 4/2042 5/40034 6/11400 7/140 8/2140 9/2102 10/140
11/140 12/5000 13/500 14/30

P14 DEG=4 F=XI AUT=288 P=(1,13,3,+) GIR=3 CN=4,4
A=1 1 5 15,22 46 152 0 400,400 1000 6400 5000 32400,27000 2[H9] W4(D2) B2XH5
D2XD4 2/23 3/46 4/224 5/20520 6/306 7/106 8/222 9/161 10/106 11/25 12/451
13/121

P15 DEG=4 F=XIP AUT=32 P=(1,22,12,+) GIR=3 CN=4,6
A=1 1 3 15,6 52 164 0 400,0 3000 2400 17000 12400,45400 2[H10] 1/120 2/420
6/11100 8/2041 11/220 12/2011 13/103 14/12

P16 DEG=4 F=IP AUT=2 P=(1,22,22,22,12) GIR=3 CN=4,6 ANTIPRISM
A=1 1 3 15,24 12 44 102 400,200 1500 2240 3000 32000,65000
E=2-2.17958 2-2 2-1.41421 2-.64885 2-.43355 0 2+1.41421 2+3.26197 4
K=(36 35 5,3) 1/6 12/4404

P17 DEG=4 F=I AUT=2 P=(1,22,1222,22) GIR=4 CN=3,8
A=1 1 1 1,30 24 12 4 402,1014 422 4240 2140 21200,50500
E=2-3.41421 2-1.84776 2-.76537 2-.58579 0 2+.76537 2+1.84776 2+2 4
K=(39 56 35 9,) 1/60 12/2003

P18 DEG=4 F=I AUT=2 P=(1,22,2222,12) GIR=4 CN=3,8
A=1 1 1 1,2 4 24 12 122,1054 50 120 14600 4300,50440
E=2-3.26197 2-2 2-1.41421 0 2+.43355 2+.64885 2+1.41421 2+2.17958 4
K=(39 55 30 6,) 1/14 12/4003

P19 DEG=4 F=IA AUT=2 P=(1,22,222,22,1) GIR=4 CN=2,8
A=1 1 1 1,32 34 2 4 14,22 1600 2600 2240 1500,74000
E=-4 2-2.61313 2-1.08239 6+0 2+1.08239 2+2.61313 4 K=(39 59 45 21 7 1,) 1/42
12/512

P20 DEG=4 F=N AUT=2 P=(1,112,111222,11) GIR=4 CN=3,8
A=1 1 1 1,30 2 4 24 14,1002 402 2320 4310 1540,6240
E=2-3.23607 -2 4-1.41421 0 2+1.23607 4+1.41421 2 4 K=(39 54 30 6,)

TRANSITIVE GRAPHS ON 16 VERTICES (CONTD)

P21 DEG=4 F=I AUT=2 P=(1,112,1222,22) GIR=4 CN=3,8
A=1 1 1 1,6 22 12 24 14,220 2110 1240 540 25000,52400
E=2-3.41421 -2 2-1.41421 2-.58579 3+0 2+1.41421 3+2 4 K=(39 56 35 9,) B2XH6
2/103 6/17 12/65

P22 DEG=4 AUT=8 P=(1,112,122,22,2) GIR=3 CN=4,4
A=1 1 5 15,6 42 142 20 410,1400 3400 200 10100 34000,72000
E=5-2 2-1.23607 5+0 2 2+3.23607 4 K=(36 34,3 1) W2[D3] 6/1250 9/2041 12/544
13/221

P23 DEG=4 F=I AUT=256 P=(1,4,14,4,2) GIR=4 CN=2,8 T=1
A=1 1 1 1,36 30 6 6 30,600 1100 1100 600 36000,36000
E=-4 2-2.82843 10+0 2+2.82843 4 K=(39 61 50 24 7 1,) H4[B1] 1/202 2/410
6/3011 9/230 10/240 12/134 13/412 14/44

P24 DEG=4 AUT=2 P=(1,112,11222,111) GIR=4 CN=3,8
A=1 1 1 1,6 30 24 14 402,202 2060 1050 700 34000,43100
E=2-3.23607 3-2 5+0 2+1.23607 3+2 4 K=(39 55 30 6,) 6/1054 9/2042

P25 DEG=4 F=I AUT=4 P=(1,22,124,22) GIR=4 CN=2,8
A=1 1 1 1,30 4 2 24 12,14 22 2640 5140 6300,1700
E=-4 2-2 4-1.41421 2+0 4+1.41421 2+2 4 K=(39 56 40 21 7 1,) D(P10) B2*H10
2/105 6/4401 8/441 11/103 12/4202 13/206 14/22

P26 DEG=4 AUT=1 P=(1/4/7/4) GIR=4 CN=2,8
A=1 1 1 1,30 6 14 2 22,10 24 6440 7100 3600,740
E=-4 -2 2-1.84776 2-1.41421 2-.76537 2+.76537 2+1.41421 2+1.84776 2 4
K=(39 56 40 21 7 1,) 12/35

P27 DEG=4 F=TIA AUT=24 P=(1,4,6,4,1) GIR=4 CN=2,8 T=2 4-CUBE
A=1 1 1 1,14 22 24 12 30,6 1500 1240 2440 2300,74000 E=-4 4-2 6+0 4+2 4
K=(39 57 40 21 7 1,) B2XH7 D3XD3 B2*H9 3/210 4/2050 5/20620 6/1103 9/214
10/110 11/240 13/1014

P28 DEG=4 F=I AUT=6 P=(1,13,36,2) GIR=4 CN=4,8
A=1 1 1 1,6 22 12 110 60,620 1104 50 10204 16000,61400
E=4-2.73205 -2 3+0 4+.73205 3+2 4 K=(39 54 25,) D(P12) 8/72 11/105 12/542
13/61

P29 DEG=5 F=XI AUT=2048 P=(1,14,2,+) GIR=3 CN=4,4
A=1 3 7 3,23 74 174 0 400,400 1400 2400 17400 17000,57000 2[H11] D2[D2] H3[B2]
1/105 2/442 3/407 4/2300 5/52402 6/3444 7/407 8/2402 9/2401 10/407 11/407
12/346 13/1060 14/31

P30 DEG=5 F=XI AUT=32 P=(1,122,2,+) GIR=3 CN=4,4
A=1 3 7 11,25 72 166 0 400,400 1400 3000 16400 17400,37000 2[H12] 1/121 2/122
6/5044 8/432 11/224 12/2340 13/134 14/13

P31 DEG=5 F=I AUT=256 P=(1,14,4,4,2) GIR=3 CN=4,4
A=1 3 7 3,23 14 60 114 260,1200 3200 500 10500 36000,76000
E=-3 2-1.82843 8-1 2+1 2+3.82843 5 K=(24 8,6 2) H4[B2] 1/203 2/414 6/3122
9/1046 10/242 12/174 13/225 14/45

P32 DEG=5 AUT=1 P=(1/5/8/2) GIR=3 CN=4,4
A=1 1 5 15,1 50 2 344 206,1010 2022 560 1242 26100,56200
E=-3 2-2.84776 2-1.76537 -1 2-.41421 2-.23463 2+.84776 2+2.41421 3 5
K=(27 20,3 1) 12/73

TRANSITIVE GRAPHS ON 16 VERTICES (CONTD)

P33 DEG=5 AUT=1 P=(1/5/8/2) GIR=3 CN=4,4
A=1 1 5 15,1 50 2 344 206,1010 2022 560 1242 36000,46300
E=2-3 2-2.41421 3-1 2-.41421 2+.41421 1 2+2.41421 3 5 K=(27 20,3 1) 6/730

P34 DEG=5 F=A AUT=1 P=(1/5/9/1) GIR=3 CN=4,6
A=1 1 1 15,5 40 42 202 610,544 120 4012 14406 1330,17100
E=-3 2-2.41421 2-2.23607 2-1 2-.41421 2+.41421 2+2.23607 2+2.41421 5
K=(27 19,3) 12/4124

P35 DEG=5 AUT=1 P=(1/5/8/2) GIR=3 CN=4,6
A=1 1 5 5,11 60 22 202 524,10 2406 1150 6042 22300,52600
E=2-3 2-2.23607 5-1 3+1 2+2.23607 3 5 K=(27 20,3) 6/12110

P36 DEG=5 F=I AUT=2 P=(1,122,2222,2) GIR=3 CN=4,6
A=1 1 5 5,11 50 24 220 540,1022 442 4012 12006 23300,14700
E=2-3.17958 2-1.64885 2-1.43355 2-1 2-.41421 1 2+2.26197 2+2.41421 5
K=(27 20 5,3) 1/111 12/1064

P37 DEG=5 AUT=8 P=(1,122,1222,12) GIR=4 CN=2,8
A=1 1 1 1,1 74 70 64 42,22 16 16 17100 13600,7600
E=-5 2-2.23607 5-1 5+1 2+2.23607 5 K=(30 40 35 21 7 1,) 6/2431 9/2064 12/334
13/416

P38 DEG=5 AUT=1 P=(1/5/A) GIR=3 CN=4,6
A=1 3 1 11,21 14 12 6 104,1220 2242 440 13420 10710,15140
E=-3 2-2.23607 4-1.73205 2-1 4+1.73205 2+2.23607 5 K=(27 19,3) 13/241

P39 DEG=5 F=I AUT=6 P=(1,23,16,3) GIR=4 CN=2,8
A=1 1 1 1,1 6 64 62 54,32 52 34 7300 14700,13500
E=-5 4-1.73205 3-1 3+1 4+1.73205 5 K=(30 39 35 21 7 1,) 8/1130 11/441 12/711
13/1007

P40 DEG=5 F=I AUT=2 P=(1,122,1222,12) GIR=4 CN=2,8
A=1 1 1 1,1 14 32 46 66,72 44 30 14700 16300,15500
E=-5 2-2.41421 3-1 2-.41421 2+.41421 3+1 2+2.41421 5 K=(30 41 35 21 7 1,)
B2*H12 2/214 6/11240 12/436

P41 DEG=5 F=I AUT=2 P=(1,122,2222,2) GIR=3 CN=4,4
A=1 1 1 3,23 12 6 10 404,1130 644 4224 2150 21600,51500
E=2-2.84776 2-2.41421 2-1.76537 2-.23463 2+.41421 2+.84776 1 2+3 5
K=(27 20,3 1) 1/23 12/2150

P42 DEG=5 F=I AUT=2 P=(1,122,2222,2) GIR=4 CN=3,8
A=1 1 1 1,1 72 66 32 46,1010 2404 4030 12044 25200,52500
E=2-4.26197 2-1 2-.56645 2-.41421 2-.35115 1 2+1.17958 2+2.41421 5
K=(30 40 25 6,) 1/45 12/4043

P43 DEG=5 AUT=1 P=(1/5/7/3) GIR=3 CN=4,6
A=1 1 1 15,11 10 6 202 406,50 1066 2160 12500 21300,42700
E=2-3.14626 -3 4-1 2-.31784 2+.31784 2+1 2+3.14626 5 K=(27 24 5,3) 12/1310

P44 DEG=5 F=I AUT=12 P=(1,23,16,3) GIR=3 CN=4,4
A=1 1 1 11,31 6 44 42 214,412 1224 2422 3100 34100,60700 E=J-3 6-1 4+1 2+3 5
K=(27 21,3 1) B2XH9 D3XD4 3/242 4/1045 5/2341 6/2413 9/1062 10/52

TRANSITIVE GRAPHS ON 16 VERTICES (CONTD)

P45 DEG=5 F=A AUT=2 P=(1,1112,111222,1) GIR=3 CN=4,4
A=1 1 1 11,31 14 12 6 242,1222 2104 5104 10440 24420,60700
E=2-3 2-2.23607 5-1 3+1 2+2.23607 3 5 K=(27 19,3 1) 6/643 9/1122

P46 DEG=5 F=A AUT=4 P=(1,122,1224,1) GIR=3 CN=4,6
A=1 1 5 3,3 14 2 202 120,140 2250 2444 5230 11424,3700
E=-3 4-2.23607 4-1 2+1 4+2.23607 5 K=(27 20,3) 9/620 11/111

P47 DEG=5 F=I AUT=4 P=(1,122,224,2) GIR=3 CN=4,4
A=1 1 1 3,23 6 12 110 604,250 124 2230 4144 31400,47400
E=-3 4-2.41421 2-1 4+.41421 2+1 2+3 5 K=(27 20,3 1) 2/602 6/6014 8/1112
11/207 12/4070 13/72 14/23

P48 DEG=5 F=I AUT=144 P=(1,14,34,3) GIR=4 CN=2,8
A=1 1 1 1,1 74 74 74 12,22 42 6 17200 17400,17100 E=-5 -3 6-1 6+1 3 5
K=(30 42 35 21 7 1,) B2XH8 B2*H11 2/111 4/1142 5/74400 6/2642 7/304 8/2114
9/2404 11/141 12/631 13/601

P49 DEG=5 F=I AUT=2 P=(1,122,1222,12) GIR=3 CN=4,6
A=1 1 1 11,25 14 12 6 442,1222 130 4144 700 31400,66200
E=2-3 2-2.41421 3-1 2-.41421 2+.41421 1 2+2.41421 3 5 K=(27 21,3) B2XH10
2/424 6/5240 12/2112

P50 DEG=5 F=IA AUT=16 P=(1,14,144,1) GIR=4 CN=3,8
A=1 1 1 1,1 74 30 244 30,1044 2422 1242 2412 1206,74100
E=2-3.82843 -3 4-1 6+1 2+1.82843 5 K=(30 34 15 3,) 2/52 6/1154 9/1144 10/304
12/4700

P51 DEG=5 F=I AUT=2 P=(1,122,22222) GIR=4 CN=4,8
A=1 1 1 1,1 70 64 210 104,1212 506 4050 12024 21442,11422
E=2-3.61313 -3 2-2.08239 2+.08239 6+1 2+1.61313 5 K=(30 32 10,) D(P19) 1/13
12/57

P52 DEG=5 F=N AUT=2 P=(1,1112,1111222) GIR=3 CN=4,4
A=1 1 1 5,25 6 2 310 214,1010 3010 4640 12620 4122,42142
E=4-2.41421 2-2.23607 -1 4+.41421 1 2+2.23607 3 5 K=(27 18,3 1)

P53 DEG=5 F=A AUT=8 P=(1,122,12222,1) GIR=4 CN=3,8
A=1 1 1 1,1 74 74 74 402,202 12 6 17040 17020,17100
E=2-4.23607 5-1 2+.23607 5+1 3 5 K=(30 40 25 6,) D(P11) 6/645 9/321 12/2405
13/501

P54 DEG=5 F=A AUT=2 P=(1,122,12222,1) GIR=3 CN=4,6
A=1 1 1 5,31 14 12 6 402,1202 1440 6220 2124 21150,14700
E=2-3 4-1.73205 3-1 1 4+1.73205 3 5 K=(27 19,3) 8/464 11/221 12/2103 13/141

P55 DEG=5 F=TVI AUT=120 P=(1,5,A) GIR=4 CN=4,8 T=2 -CLEBSCH GRAPH
A=1 1 1 1,1 14 142 44 522,224 160 6412 3050,630,64006 E=5-3 10+1 5
K=(30 30 5,) D(P27) 3/604 4/1051 5/2170 6/11220 9/1114 10/54 11/54 13/1023

P56 DEG=6 F=XTI AUT=18432 P=(1,6,1,+) GIR=3 CN=4,4 T=1
A=1 1 7 7,37 37 176 0 400,400 3400 3400 17400 17400,77000 2[H13] -D(P109)
D2[D3] H5[81] 1/124 2/460 3/143 4/3024 5/71003 6/14006 7/460 8/2143 9/2403
10/143 11/160 12/7000 13/700 14/214

TRANSITIVE GRAPHS ON 16 VERTICES (CONTD)

P57 DEG=6 F=I AUT=2 P=(1,1122,12222) GIR=3 CN=4,4
A=1 1 5 15,1 1 6 322 652,1104 444 4162 2152 26320,16250
E=-4 2-3.41421 2-1.41421 2-.58579 3+0 2+1.41421 3+2 6 K=(21 14,3 1) 2/243
6/6214 12/4071

P58 DEG=6 F=I AUT=6 P=(1,123,36) GIR=3 CN=4,4
A=1 3 7 1,1 1 42 22 102,1550 1464 4730 3324 744,41270
E=-4 4-2.73205 3+0 4+.73205 3+2 6 K=(21 12,3 1) D(P28) 8/1047 11/445 12/751
13/75

P59 DEG=6 AUT=4 P=(1,1122,1224) GIR=3 CN=4,6
A=1 1 1 11,5 5 36 26 416,342 342 5120 4510 33060,32450
E=4-3.23607 -2 4+0 4+1.23607 2+2 6 K=(21 14,3) D(P46) 9/1504 11/305

P60 DEG=6 F=A AUT=1 P=(1/6/8/1) GIR=3 CN=4,4
A=1 3 5 15,21 41 150 6 354,1500 2102 4422 10432 16240,66600
E=2-3.23607 3-2 2-1.23607 4+0 2+1.23607 2+3.23607 6 K=(18 9,6 1) 9/3022

P61 DEG=6 AUT=8 P=(1,1122,1222,2) GIR=3 CN=4,4
A=1 1 5 15,5 45 6 160 550,302 2242 232 10232 27400,57400
E=-4 4-2 2-1.23607 5+0 2 2+3.23607 6 K=(18 8,6 2) 6/1163 9/2035 12/372 13/227

P62 DEG=6 F=A AUT=1 P=(1/6/8/1) GIR=3 CN=4,4
A=1 1 5 1,35 61 134 2 422,734 410 5006 15042 5502,74600
E=2-3.41421 -2 2-1.84776 2-.76537 2-.58579 0 2+.76537 2+1.84776 4 6
K=(18 9,6 2) 12/2107

P63 OEG=6 F=A AUT=1 P=(1/6/8/1) GIR=3 CN=4,4
A=1 1 5 1,35 61 134 2 422,734 410 5102 15042 5406,74600
E=2-3.41421 2-2 2-1.41421 2-.58579 3+0 2+1.41421 2 4 6 K=(18 9,6 2) 6/365

P64 DEG=6 F=A AUT=1 P=(1/6/8/1) GIR=3 CN=4,4
A=1 1 1 5,35 31 154 2 422,734 410 5006 4502 35042,35600
E=2-3.23607 4-2 5+0 2+1.23607 2 4 6 K=(18 9,6 1) 6/5064

P65 DEG=6 F=I AUT=2 P=(1,222,12222) GIR=3 CN=4,6
A=1 1 5 3,13 25 6 130 470,304 242 3222 4614 26500,57040
E=2-2.61313 5-2 2-1.08239 2+1.08239 2+2 2+2.61313 6 K=(18 6,6) 1/62 12/2215

P66 DEG=6 F=I AUT=2 P=(1,222,1222,2) GIR=3 CN=4,6
A=1 1 1 11,23 55 6 134 72,242 2304 3022 4414 34600,73200
E=2-3.41421 2-2.17958 2-.64885 2-.58579 2-.43355 2+0 2 2+3.26197 6 K=(18 10,6)
-D(P77) 1/224 12/6402

P67 DEG=6 F=A AUT=1 P=(1/6/8/1) GIR=3 CN=4,6
A=1 1 5 1,1 51 74 62 12,1624 2050 5106 1526 4162,55600
E=2-4.14626 -2 2-1.31784 2-.68216 4+0 2+2 2+2.14626 6 K=(21 18 5,3) 12/1245

P68 DEG=6 F=I AUT=2 P=(1,222,12222) GIR=3 CN=4,6
A=1 1 5 13,1 1 146 14 422,1250 2720 5110 12460 11146,20546
E=2-4 2-1.84776 2-1.41421 2-.76537 2+.76537 2+1.41421 2+1.84776 2 6 K=(21 15,3)
1/144 12/5220

P69 DEG=6 F=I AUT=2 P=(1,222,1222,2) GIR=4 CN=2,8
A=1 1 1 1,1 1 36 174 172,162 154 116 66 36600,37200
E=-6 2-1.84776 2-1.41421 2-.76537 2+0 2+.76537 2+1.41421 2+1.84776 6
K=(24 35 35 21 7 1,) 1/250 12/536

TRANSITIVE GRAPHS ON 16 VERTICES (CONTD)

P70 DEG=6 F=I AUT=256 P=(1,24,144) GIR=4 CN=3,8
A=1 1 1 1,1 1 176 120 450,450 3120 3126 4456 3126,4456
E=2-4.82843 -2 8+0 2+.82843 2+2 6 K=(24 28 15 3,) D(P20) D(P23) D(P50) D(P53)
H6[81] 1/70 2/506 6/3324 9/516 10/305 12/4740 13/312 14/34

P71 DEG=6 AUT=2 P=(1,1122,12222) GIR=3 CN=4,4
A=1 1 5 15,21 51 6 164 554,1002 2402 4212 12222 26300,56240
E=4-2.73205 2-2 3+0 4+.73205 2 4 6 K=(18 8,6 1) 8/2072 11/125 12/2644 13/1124

P72 DEG=6 F=I AUT=2 P=(1,1122,1222,2) GIR=3 CN=4,4
A=1 1 5 15,21 51 6 164 554,222 2212 4102 12042 35200,72600
E=2-3.41421 2-2 2-1.41421 2-.58579 3+0 2+1.41421 2 4 6 K=(18 10,6 1) B2XH12
2/63 6/4644 12/2047

P73 DEG=6 F=IA AUT=2 P=(1,222,2222,1) GIR=3 CN=4,6
A=1 3 3 5,1 1 132 74 144,142 2110 5060 12314 5462,17600
E=2-4.02734 3-2 4+0 2+.33182 2+1.19891 2+2.49661 6 K=(21 17 5,3) 1/214
12/1522

P74 DEG=6 F=I AUT=4 P=(1,24,1224) GIR=3 CN=4,6
A=1 1 5 5,13 23 170 340 230,1002 404 6502 7024 26442,17014
E=2-2.82843 3-2 4-1.41421 4+1.41421 2+2.82843 6 K=(18 7,6) 1/150 12/1603
13/245 14/320

P75 DEG=6 F=I AUT=16 P=(1,114,144) GIR=3 CN=4,4
A=1 1 5 5,25 15 6 60 510,460 3110 5242 2702 15222,22612
E=2-2.82843 5-2 4+0 2+2 2+2.82843 6 K=(18 2,6 2) 2/415 6/1352 9/2161 10/123
12/1234

P76 DEG=6 F=A AUT=4 P=(1,114,11114,1) GIR=3 CN=4,4
A=1 1 5 5,25 15 170 2 770,4 2442 6412 2502 22422,76200
E=-4 3-2 4-1.41421 2+0 4+1.41421 4 6 K=(18 9,6 2) 6/2362 8/255

P77 DEG=6 F=I AUT=2 P=(1,222,222,12) GIR=3 CN=4,4
A=1 1 3 5,33 75 24 12 452,324 1402 2204 14600 36200,75400
E=2-2.49661 3-2 2-1.19891 2-.33182 4+0 2+4.02734 6 K=(15 1,9 4) 1/244 12/1017

P78 DEG=6 AUT=1 P=(1/6/9) GIR=3 CN=4,6
A=1 1 1 5,1 61 30 306 116,650 2024 4152 5252 3422,54244
E=-4 2-3.23607 2-2 5+0 2+1.23607 3+2 6 K=(21 14,3) 6/6610

P79 DEG=6 F=A AUT=1 P=(1/6/8/1) GIR=3 CN=4,4
A=1 1 1 11,37 5 134 32 442,314 3002 4104 11422 34500,57200
E=2-3.41421 -2 2-1.41421 2-1.23607 2-.58579 2+0 2+1.41421 2+3.23607 6
K=(18 8,6 1) 12/1642

P80 DEG=6 AUT=1 P=(1/6/9) GIR=3 CN=4,6
A=1 1 1 11,1 61 24 256 16,14 2304 6062 5072 3702,13340
E=-4 2-3.26197 -2 2-1.41421 0 2+.43355 2+.64885 2+1.41421 2+2.17958 6
K=(21 14,3) D(P34) 12/1303

P81 DEG=6 F=TYI AUT=72 P=(1,6,9) GIR=3 CN=4,4 T=1
A=1 3 7 1,21 61 104 22 430,1624 442 5050 16244 4702,51310 E=9-2 6+2 6
K=(18 6,6 2) L(H8) D4XD4 -D4*D4 3/423 4/217 5/1274 6/3066 9/433 10/423 11/243
13/1403

TRANSITIVE GRAPHS ON 16 VERTICES (CONTD)

P82 DEG=6 F=I AUT=768 P=(1,6,16,2) GIR=4 CN=2,8 T=1
A=1 1 1 1,1 1 176 170 170,146 146 36 36 37400,37400 E=-6 3-2 8+0 3+2 6
K=(24 36 35 21 7 1,) H7[B1] B2*M13 D3*D4 2/640 3/540 4/2131 5/7411D 6/5501
7/310 8/1414 9/3200 10/540 11/213 12/707 13/417 14/142

P83 DEG=6 F=A AUT=1 P=(1/6/8/1) GIR=3 CN=4,4
A=1 1 1 5,35 51 130 6 402,1310 2640 1026 11036 5502,56600
E=-4 2-2.17958 -2 2-1.41421 2-.64885 2-.43355 0 2+1.41421 2+3.26197 6
K=(18 8,6 2) 12/1107

P84 DEG=6 F=RI AUT=12 P=(1,6,36) GIR=3 CN=4,6 T=1 SHRIKHANDE GRAPH
A=1 3 5 3,11 61 30 104 42,614 3222 1250 11406 7540,30720 E=9-2 6+2 6
K=(18 4,6) 3/310 6/4550 11/640 13/1411

P85 DEG=6 F=I AUT=2 P=(1,222,12222) GIR=3 CN=4,6
A=1 1 1 11,21 11 140 56 526,264 2312 4044 12102 30624,31212
E=2-3.41421 2-3.26197 2-.58579 2+0 2+.43355 2+.64885 2 2+2.17958 6 K=(21 14,3)
1/122 12/3022

P86 DEG=6 AUT=8 P=(1,1122,12222) GIR=3 CN=4,4
A=1 1 5 15,5 45 6 170 570,1202 2602 222 10212 36100,76040
E=2-3.23607 4-2 5+0 2+1.23607 2 4 6 K=(18 8,6 2) D(P22) 6/2607 9/507 12/2072
13/324

P87 DEG=6 F=I AUT=16 P=(1,24,124,2) GIR=4 CN=2,8
A=1 1 1 1,1 1 170 174 172,126 56 146 36 36600,37200
E=-6 -2 4-1.41421 4+0 4+1.41421 2 6 K=(24 35 35 21 7 1,) 2/305 6/1171 8/2224
11/310 12/635 13/611 14/304

P88 DEG=6 AUT=1 P=(1/6/7/2) GIR=3 CN=4,4
A=1 1 7 1,15 31 160 6 412,1022 3120 1446 364 26600,56600
E=-4 4-2 2-1.23607 5+0 2 2+3.23607 6 K=(18 9,6 1) 6/5062

P89 DEG=6 F=I AUT=16 P=(1,114,124,2) GIR=3 CN=4,4
A=1 1 5 5,15 25 6 170 570,242 2212 302 10222 37000,76400 E=-4 5-2 6+0 2+2 4 6
K=(18 10,6 2) B2XH11 2/446 4/256 5/4545 6/317 7/446 8/1123 9/2442 11/146
12/746 13/1061

P90 DEG=6 F=I AUT=4 P=(1,222,1224) GIR=3 CN=4,6
A=1 1 1 11,11 21 146 146 146,320 2250 5024 4422 32414,33012
E=2-4 -2 4-1.41421 2+0 4+1.41421 2+2 6 K=(21 15,3) D(P54) 2/175 6/10151 8/545
11/223 12/2407 13/540 14/52

P91 DEG=6 F=IA AUT=4 P=(1,24,1124,1) GIR=3 CN=4,6
A=1 1 3 5,23 15 170 6 320,250 2442 1504 12412 5424,77000
E=2-2.82843 5-2 4+0 2+2 2+2.82843 6 K=(18 8,6) 2/610 6/11150 9/1430 10/310
12/3300

P92 DEG=6 AUT=1 P=(1/6/9) GIR=3 CN=4,4
A=1 1 5 1,31 17 164 16 502,1040 2002 6264 5412 7420,66220
E=4-2.73205 -2 2-1.23607 2+0 4+.73205 2+3.23607 6 K=(18 8,6 1) 13/261

P93 DEG=6 F=N AUT=2 P=(1,11112,111222) GIR=3 CN=4,6
A=1 3 5 11,1 1 30 206 762,510 450 6122 6062 14344,22344
E=-4 2-3.23607 4-1.41421 0 2+1.23607 4+1.41421 2 6 K=(21 13,3)

TRANSITIVE GRAPHS ON 16 VERTICES (CONTD)

P94 DEG=6 F=I AUT=12 P=(1,123,36) GIR=3 CN=4,4
A=1 3 7 1,1 1 162 162 162,450 230 6224 6444 31110,47104 E=2-4 3-2 6+0 4+2 6
K=(21 15,3 1) D(P45) 3/605 4/2151 5/54064 6/2417 9/3101 10/605

P95 DEG=6 AUT=2 P=(1,11112,111222) GIR=3 CN=4,4
A=1 3 7 1,1 1 30 224 762,550 550 4304 2244 34122,32062
E=-4 2-3.23607 2-2 5+0 2+1.23607 3+2 6 K=(21 13,3 1) 6/751 9/364

P96 DEG=7 F=XTI AUT=203212800 P=(1,7,+) GIR=3 CN=8,2 T=2
A=1 3 7 17,37 77 177 0 400,1400 3400 7400 17400 37400,77400 2[H14] SW(H14)
SW(H5) D2[D4] H5[B2] 1/125 2/132 3/147 4/2446 5/62311 6/14206 7/612 8/2602
9/2503 10/147 11/164 12/7040 13/720 14/215

P97 DEG=7 F=I AUT=4 P=(1,124,224) GIR=3 CN=4,4
A=1 3 7 11,5 51 25 60 700,1540 3620 5152 14546 2632,43226 E=4-3 5-1 4+1 2+3 7
K=(12 2,9 1) 3/311 6/4463 11/324 13/163

P98 DEG=7 AUT=1 P=(1/7/8) GIR=3 CN=4,4
A=1 1 5 11,5 75 45 330 426,1442 3102 7430 4252 26222,70246
E=2-3.14626 2-3 3-1 2-.31784 2+.31784 2+1 2+3.14626 7 K=(12 1,9 4) 12/1722

P99 DEG=7 AUT=1 P=(1/7/8) GIR=3 CN=4,4
A=1 3 7 11,5 61 45 324 430,1426 3140 5252 7102 24720,70252
E=3-3 2-2.23607 4-1 3+1 2+2.23607 3 7 K=(12 3,9 2) 6/13121

P100 DEG=7 AUT=1 P=(1/7/8) GIR=3 CN=4,4
A=1 1 7 1,15 61 123 124 606,1434 1246 2032 11512 16260,74540
E=2-3 2-2.23607 4-1.73205 -1 4+1.73205 2+2.23607 7 K=(12 2,9 2) 13/1413

P101 DEG=7 F=I AUT=2 P=(1,1222,2222) GIR=3 CN=4,4
A=1 1 5 7,33 11 105 350 324,1102 2602 4056 12036 17540,27620
E=2-3.17958 2-2.41421 2-1.64885 2-1.43355 2+.41421 2+1 2+2.26197 3 7
K=(12 4,9 1) 1/131 12/3043

P102 DEG=7 AUT=1 P=(1/7/8) GIR=3 CN=4,4
A=1 1 3 5,25 17 105 214 450,1542 3604 4260 13162 14232,51432
E=2-3.17958 -3 2-1.64885 2-1.43355 -1 2-.41421 1 2+2.26197 2+2.41421 7
K=(12 2,9 3) 12/4646

P103 OEG=7 F=I AUT=2 P=(1,1222,11222) GIR=3 CN=4,4
A=1 3 3 7,13 11 105 74 474,1110 3204 2342 14322 16540,66620
E=3-3 2-2.41421 2-1 2-.41421 2+.41421 1 2+2.41421 3 7 K=(12 4,9 2) 2/261
6/14013 12/2323

P104 DEG=7 AUT=2 P=(1,1222,11222) GIR=3 CN=4,4
A=1 3 3 7,13 5 111 74 474,142 2222 7104 17210 12740,64720
E=3-3 4-1.73205 2-1 1 4+1.73205 3 7 K=(12 2,9 2) 8/1245 11/622 12/2722 13/156

P105 DEG=7 F=I AUT=2 P=(1,1222,11222) GIR=3 CN=4,4
A=1 3 3 13,7 1 1 360 714,1502 1602 2354 4334 26270,16164
E=-5 -3 2-2.41421 2-1 2-.41421 2+.41421 3+1 2+2.41421 7 K=(15 8,6 2) O(P33)
D(P83) 2/541 6/3711 12/1706

P106 DEG=7 AUT=2 P=(1,1222,11222) GIR=3 CN=4,6
A=1 3 3 3,3 21 41 360 714,1406 1412 2354 4334 26264,16170
E=-5 -3 4-1.73205 2-1 3+1 4+1.73205 7 K=(15 8,6) 8/2524 11/341 12/5424 13/642

TRANSITIVE GRAPHS ON 16 VERTICES (CONTD)

P107 DEG=7 F=I AUT=8 P=(1,124,44) GIR=3 CN=4,4
A=1 3 7 11,5 31 45 252 126,1126 652 6300 15220 32540,71460 E=4-3 5-1 4+1 2+3 7
K=(12 4,9 3) 3/607 4/1076 5/3217 6/1725 9/317 10/427 11/247 13/463

P108 DEG=7 AUT=1 P=(1/7/8) GIR=3 CN=4,4
A=1 3 1 7,31 51 61 300 504,1414 3432 6132 646 23246,31710
E=3-3 2-2.41421 2-1 2-.41421 2+.41421 1 2+2.41421 3 7 K=(12 3,9 3) 6/12701

P109 DEG=7 F=I AUT=768 P=(1,16,6,2) GIR=3 CN=4,4
A=1 3 7 3,23 3 103 360 760,74 314 2074 4314 37400,77400 E=-5 11-1 3+3 7
K=(12 8,9 3) SW(H11) SW(H2) SW(H7) -D(P132) -D(P44) H7[B2] 2/447 3/324 4/2067
5/72510 6/10307 7/512 8/742 9/3201 10/541 11/147 12/5070 13/1260 14/123

P110 DEG=7 F=N AUT=2 P=(1,111112,11222) GIR=3 CN=4,4
A=1 1 7 15,23 5 105 56 466,230 2130 5302 13302 26540,56640
E=-3 4-2.41421 2-2.23607 4+.41421 1 2+2.23607 3 7 K=(12 2,9 2)

P111 DEG=7 F=I AUT=256 P=(1,124,44) GIR=3 CN=6,4
A=1 3 7 3,3 23 43 240 520,1520 3640 3254 4534 13254,24534
E=2-3.82843 9-1 2+1.82843 2+3 7 K=(12,9 3) D(P31) H6[B2] 1/223 2/57 6/2627
9/333 10/307 12/1741 13/525 14/251

P112 DEG=7 F=IA AUT=4 P=(1,124,124,1) GIR=3 CN=4,4
A=1 3 7 11,5 51 25 360 640,1520 2152 5146 2232 21226,77400
E=2-3.82843 9-1 2+1.82843 2+3 7 K=(12 6,9 1) SW(H12) SW(H6) -D(P138) -D(P49)
2/522 6/10564 9/2245 10/131 12/3340

P113 DEG=7 AUT=1 P=(1/7/8) GIR=3 CN=4,4
A=1 3 5 1,7 71 121 234 116,434 1152 3022 14640 33602,36260
E=3-3 2-2.23607 4-1 3+1 2+2.23607 3 7 K=(12 3,9 2) 6/11215

P114 DEG=7 AUT=1 P=(1/7/8) GIR=3 CN=4,4
A=1 1 1 15,15 75 75 374 202,1010 3402 3022 17006 17102,76042
E=2-2.84776 2-2.41421 2-1.76537 -1 2-.23463 2+.41421 2+.84776 1 5 7
K=(9 2,12 8) 12/2266

P115 DEG=7 F=I AUT=2 P=(1,1222,2222) GIR=3 CN=4,6
A=1 1 5 11,5 1 1 250 524,1352 726 5252 12526 1372,766
E=2-5.02734 3-1 2-.66818 2+.19891 4+1 2+1.49661 7 K=(18 16 5,3) D(P18) D(P36)
D(P42) D(P67) D(P73) 1/47 12/4057

P116 DEG=7 AUT=4 P=(1,1114,11114) GIR=3 CN=4,4
A=1 1 1 15,35 55 135 374 10,1402 1006 7102 17022 17042,67202
E=-3 4-2.41421 3-1 4+.41421 2+1 5 7 K=(9 2,12 8) -D(P88) 6/3626 8/3013

P117 DEG=7 AUT=1 P=(1/7/8) GIR=3 CN=4,4
A=1 1 1 1,15 61 45 314 336,1322 2016 4462 12414 24472,34322
E=2-4.26197 -3 -1 2-.56645 2-.41421 2-.35115 1 2+1.17958 2+2.41421 7
K=(15 8,6 1) D(P/9) 12/1354

P118 DEG=7 AUT=2 P=(1,111112,11222) GIR=3 CN=4,4
A=1 3 1 17,31 5 105 56 456,1340 3340 4222 12122 34610,72510
E=3-3 2-2.23607 4-1 3+1 2+2.23607 3 7 K=(12 2,9 3) 6/557 9/565

P119 DEG=7 AUT=1 P=(1/7/8) GIR=3 CN=4,6
A=1 1 5 1,1 65 45 232 122,502 3654 3454 372 13232,23066
E=2-4.23607 2-2.41421 -1 2-.41421 2+.23607 2+.41421 2+1 2+2.41421 7 K=(15 8,6)
12/3403

TRANSITIVE GRAPHS ON 16 VERTICES (CONTD)

P120 DEG=7 AUT=1 P=(1/7/8) GIR=3 CN=4,4
A=1 1 1 5,25 21 105 344 116,106 3430 6252 772 7252,13432
E=2-4.23607 -3 4-1 2+.23607 5+1 3 7 K=(15 8,6 1) D(P64) 6/5245

P121 DEG=7 F=I AUT=4 P=(1,1222,224) GIR=3 CN=4,4
A=1 1 5 7,33 3 103 36 456,360 2360 4610 15104 32510,73204
E=2-3 4-2.41421 -1 4+.41421 2+1 2+3 7 K=(12 4,9 2) 2/622 6/10706 8/1246
11/624 12/2370 13/334 14/53

P122 DEG=7 F=I AUT=2 P=(1,1222,2222) GIR=3 CN=6,4
A=1 1 5 11,5 55 35 12 406,1230 2544 3262 4562 25642,13522
E=2-3.49661 2-2.19891 2-1.33182 3-1 4+1 2+3.02734 7 K=(12,9 4) 1/311 12/1552

P123 DEG=7 F=I AUT=2 P=(1,1222,2222) GIR=3 CN=4,4
A=1 1 1 13,27 51 25 310 704,1152 626 5410 13404 32132,34246
E=2-3.61313 2-2.08239 5-1 2+.08239 2+1.61313 2+3 7 K=(12 4,9 1) D(P9) 1/33
12/2255

P124 DEG=7 AUT=1 P=(1/7/8) GIR=3 CN=4,4
A=1 1 1 15,25 1 121 344 156,1252 2422 4116 4716 14342,53430
E=-5 -3 2-2.23607 4-1 5+1 2+2.23607 7 K=(15 8,6 1) 6/5252

P125 DEG=7 F=I AUT=2 P=(1,1222,2222) GIR=3 CN=4,4
A=1 3 3 11,25 7 13 262 562,314 2314 5044 12430 34620,73140
E=2-3 2-2.84776 2-1.76537 2-.41421 2-.23463 2+.84776 2+2.41421 3 7 K=(12 4,9 2)
1/305 12/5260

P126 DEG=7 AUT=1 P=(1/7/8) GIR=3 CN=4,6
A=1 3 5 1,21 1 125 340 526,474 434 5172 7202 22352,24552
E=2-4.23607 4-1.73205 -1 2+.23607 2+1 4+1.73205 7 K=(15 8,6) 13/1304

P127 DEG=7 F=I AUT=2 P=(1,1222,2222) GIR=3 CN=4,4
A=1 3 3 1,1 13 7 22 42,770 1364 1670 11564 5654,3534
E=-5 2-2.84776 2-1.76537 2-.41421 2-.23463 2+.84776 2+1 2+2.41421 7
K=(15 8,6 2) D(P32) 1/53 12/676

P128 DEG=7 AUT=1 P=(1/7/8) GIR=3 CN=4,4
A=1 3 1 11,15 21 127 350 36,444 3122 6120 13016 16642,31550
E=2-3 2-2.41421 2-2.23607 -1 2-.41421 2+.41421 2+2.23607 2+2.41421 7
K=(12 2,9 2) 12/1632

P129 DEG=7 F=I AUT=4 P=(1,124,1124) GIR=3 CN=4,6
A=1 1 1 11,5 51 25 360 414,652 526 5312 3306 25072,13066
E=2-3.82843 2-3 3-1 6+1 2+1.82843 7 K=(15 7,6) D(P91) 2/431 6/13013 9/2330
10/644 12/4625

P130 DEG=7 F=TIA AUT=5040 P=(1,7,7,1) GIR=4 CN=2,8 T=2
A=1 1 1 1,1 1 1 374 372,366 356 336 276 176,77400 E=-7 7-1 7+1 7
K=(21 35 35 21 7 1,) SW(H1) SW(H8) -W8(B2) -B2XH14 B2*H14 2/644 4/1231 5/2754
6/6262 7/644 8/2454 9/1254 11/541 12/736 13/607

P131 DEG=7 F=I AUT=2 P=(1,1222,2222) GIR=3 CN=4,4
A=1 3 7 1,1 11 105 262 162,352 2326 5450 13424 21270,50564
E=2-4.26197 2-2.41421 2-.56645 2-.35115 2+.41421 2+1 2+1.17958 3 7 K=(15 8,6 1)
D(P41) 1/321 12/6043

TRANSITIVE GRAPHS ON 16 VERTICES (CONTD)

P132 DEG=7 F=IA AUT=48 P=(1,16,16,1) GIR=3 CN=4,4
A=1 1 1 15,15 75 75 374 202,1006 1012 7022 7042 36102,77400 E=3-3 7-1 4+1 5 7
K=(9 3,12 8) SW(H13) SW(H3) SW(H9) -D(P61) -D(P89) B2XH13 2/464 4/1454 5/65405
6/7604 7/461 8/1231 9/2443 11/231 12/2531 13/701

P133 DEG=7 F=I AUT=16 P=(1,124,224) GIR=3 CN=4,4
A=1 1 1 3,3 43 23 6 12,770 3364 1654 11534 1714,41474
E=-5 4-2.41421 -1 4+.41421 4+1 3 7 K=(15 8,6 2) D(P47) 2/217 6/5207 8/2512
11/154 12/5142 13/1074 14/305

P134 DEG=7 AUT=1 P=(1/7/8) GIR=3 CN=4,6
A=1 3 5 5,33 41 111 220 466,1700 2426 2510 17022 34710,10356
E=2-3.14626 2-3 3-1 2-.31784 2+.31784 2+1 2+3.14626 7 K=(12 5,9) 12/3026

P135 DEG=7 AUT=1 P=(1/7/8) GIR=3 CN=4,4
A=1 1 5 1,35 1 105 350 136,1262 242 4132 16506 17424,4732
E=2-4.23607 2-2.23607 3-1 2+.23607 4+1 2+2.23607 7 K=(15 8,6 1) D(P60) 9/712

P136 DEG=7 AUT=8 P=(1,1222,11222) GIR=3 CN=4,4
A=1 1 1 3,3 43 23 360 774,64 70 6314 6314 26416,16416
E=2-4.23607 -3 4-1 2+.23607 5+1 3 7 K=(15 7,6 2) D(P24) D(P62) D(P63) 6/2566
9/2136 12/2613 13/515

P137 DEG=7 AUT=8 P=(1,1222,11222) GIR=3 CN=4,6
A=1 3 3 1,1 43 23 314 774,406 412 6360 6360 26074,16074
E=-5 -3 2-2.23607 4-1 5+1 2+2.23607 7 K=(15 9,6) 6/14450 9/1604 12/5203
13/1450

P138 OEG=7 F=IA AUT=4 P=(1,124,124,1) GIR=3 CN=4,4
A=1 1 1 13,7 73 67 14 132,246 1510 2604 15430 16444,77400
E=2-3 2-1.82843 7-1 2+1 2+3.82843 7 K=(9 1,12 6) SW(H10) SW(H4) -D(P112)
-D(P21) -D(P43) -D(P72) 2/614 6/6512 9/3015 10/132 12/3112

P139 DEG=7 F=I AUT=4 P=(1,124,224) GIR=3 CN=6,4
A=1 1 1 13,27 33 147 132 246,1010 2404 6510 7204 36430,37044
E=4-2.41421 2-1.82843 3-1 4+.41421 2+3.82843 7 K=(9,12 6) D(P16) -D(P17)
-D(P66) 1/151 12/4174 13/1432 14/47

P140 OEG=7 F=I AUT=16 P=(1,124,1124) GIR=3 CN=4,4
A=1 1 1 3,3 43 23 360 774,406 412 6254 16134 6254,46134 E=-5 2-3 5-1 6+1 3 7
K=(15 9,6 2) D(P76) 3/614 4/616 5/3750 6/3534 7/621 8/634 9/1075 10/622

P141 DEG=7 AUT=1 P=(1/7/8) GIR=3 CN=4,4
A=1 1 1 5,31 21 121 344 356,1152 2422 4216 12424 24616,34152
E=-5 -3 2-2.41421 2-1 2-.41421 2+.41421 3+1 2+2.41421 7 K=(15 9,6 1) D(P35)
6/5072

P142 DEG=7 AUT=2 P=(1,1222,11222) GIR=3 CN=4,4
A=1 1 1 11,25 47 33 60 414,1112 3206 5524 3650 12532,24646
E=2-3 4-2.23607 3-1 2+1 4+2.23607 7 K=(12 3,9 2) 9/3007

P143 DEG=7 AUT=2 P=(1,1222,11222) GIR=3 CN=4,6
A=1 1 1 11,25 27 53 60 414,1212 3106 3544 5630 12532,24646
E=2-3 4-2.23607 3-1 2+1 4+2.23607 7 K=(12 1,9) 11/641

TRANSITIVE GRAPHS ON 17 VERTICES

```
Q1  DEG=0 F=XTVIAP  P=(1,+)  CN=1,17

Q2  DEG=2 F=TVIP AUT=2  P=(1,2,2,2,2,2,2,2,2)  GIR=17 CN=3,9  POLYGON
A=1 1 4 2,20 10 100 40 400,200 2000 1000 10000 4000,40000 120000
E=2-1.9659 2-1.7004 2-1.2053 2-.5473 2+.1845 2+.8915 2+1.4780 2+1.8649 2
K=(78 220 330 252 84 8,)  1/100

Q3  DEG=4 F=VI AUT=4  P=(1,4,44,4)  GIR=4 CN=3,9  T=1
A=1 1 1 1,2 4 120 50 214,70 122 406 4040 22200,30100 141400
E=4-2.90570 4-.48793 4+.34415 4+2.04948 4  K=(48 80 55 12,)  1/11

Q4  DEG=4 F=VI AUT=2  P=(1,22,22,22,22)  GIR=3 CN=4,6
A=1 1 3 15,24 12 44 102 500,240 1400 2200 12000 5000,70000 164000
E=2-2.2478 2-1.7814 2-1.7526 2-.8090 2-.3138 2-.1010 2+1.6626 2+3.3430 4
K=(45 56 15,3)  D(Q2) 1/210

Q5  DEG=4 F=VI AUT=2  P=(1,22,2222,22)  GIR=4 CN=3,9
A=1 1 1 1,2 4 24 12 122,1054 50 120 14400 14200,40440 120300
E=2-3.1712 2-2.5133 2-1.0207 2-.2224 2+.1645 2+1.0760 2+1.3176 2+2.3695 4
K=(48 80 55 12,)  1/14

Q6  DEG=4 F=VI AUT=2  P=(1,22,222,222)  GIR=4 CN=3,9
A=1 1 1 1,34 32 4 2 14,22 400 4200 12500 5240,12400 105200
E=2-3.66638 2-1.51590 2-1.07447 2-.36279 2+.27275 2+.65968 2+.93069 2+2.75642 4
K=(48 84 75 36 7,)  1/300

Q7  DEG=6 F=VI AUT=2  P=(1,222,22222)  GIR=3 CN=5,6
A=1 3 3 5,1 1 70 130 212,1424 1344 2542 10304 4442,61120 162050
E=2-3.4818 2-2.7749 2-2.0632 2-.2746 2+.7905 2+1.1152 2+1.5512 2+2.1377 6
K=(27 20,3)  1/130

Q8  DEG=6 F=VI AUT=2  P=(1,222,222,22)  GIR=3 CN=5,5
A=1 1 3 5,33 75 24 12 452,324 1402 2204 14200 34400,65400 172200
E=2-2.32874 2-2.27974 2-1.80144 2-.76974 2-.62442 2+.11235 2+.45729 2+4.23444 6
K=(21 4,9 4)  -D(Q6) 1/61

Q9  DEG=6 F=VI AUT=2  P=(1,222,22222)  GIR=3 CN=5,6
A=1 1 5 3,25 13 142 344 510,260 3020 7010 10014 24022,72202 65404
E=2-2.7212 2-2.1884 2-1.6932 2-1.6218 2-1.0408 2+1.5022 2+1.8222 2+2.9410 6
K=(24 12,6)  1/141

Q10  DEG=6 F=VI AUT=2  P=(1,222,2222,2)  GIR=3 CN=4,6
A=1 1 1 11,23 55 134 72 4,1002 2214 1422 12042 5104,73400 67200
E=2-3.4530 2-2.0142 2-1.3563 2-.8611 2-.3034 2+.0835 2+1.3770 2+3.5275 6
K=(24 16 5,6)  1/64

Q11  DEG=6 F=VI AUT=2  P=(1,222,2222,2)  GIR=3 CN=4,6
A=1 3 3 5,1 1 132 74 462,314 2102 5044 4150 10160,65200 172400
E=2-4.2137 2-1.5681 2-1.3063 2-.8899 2-.0379 2+1.0560 2+1.1642 2+2.7956 6
K=(27 28 10,3)  -D(Q8) 1/112

Q12  DEG=6 F=VI AUT=2  P=(1,222,22222)  GIR=4 CN=3,9
A=1 1 1 1,1 1 172 174 64,1112 2204 5402 12024 25012,50164 24152
E=2-4.87165 2-1.42769 2-1.03525 2+.34905 2+.40355 2+.52869 2+.84421 2+2.20910 6
K=(30 40 25 6,)  1/51
```

TRANSITIVE GRAPHS ON 17 VERTICES (CONTD)

```
Q13  DEG=6 F=VI AUT=2  P=(1,222,22222)  GIR=3 CN=4,6
A=1 1 1 11,21 11 56 326 40,100 3064 3112 12044 25102,23224 43412
E=2-3.71854 2-2.98668 2-.64833 2-.38282 2-.12926 2+.66906 2+1.64253 2+2.55403 6
K=(27 24 5,3)  1/106

Q14  DEG=8 F=VIS AUT=4  P=(1,44,44)  GIR=3 CN=5,5
A=1 3 5 13,31 15 23 7 724,652 2552 1364 3242 32160,74510 165604
E=4-3.39363 4-.85622 4-.14378 4+2.39363 8  K=(12 4,12 4)  D(Q3) -D(Q3) 1/226

Q15  DEG=8 F=VIS AUT=2  P=(1,2222,2222)  GIR=3 CN=5,5
A=1 3 3 5,11 61 27 17 660,1710 2532 1274 16114 15062,61544 162342
E=2-3.5340 2-2.3488 2-2.0952 2-1.8536 2+.8536 2+1.0952 2+1.3488 2+2.5340 8
K=(12 4,12 4)  1/56

Q16  DEG=8 F=VI AUT=2  P=(1,2222,2222)  GIR=3 CN=6,5
A=1 1 5 13,35 33 21 211 122,1054 2706 1646 11650 26720,33506 47246
E=2-3.9802 2-1.9750 2-1.6169 2-1.1717 2-.8507 2+1.0038 2+2.2685 2+2.3222 8
K=(12,12 4)  -Q21 1/232

Q17  DEG=8 F=VI AUT=2  P=(1,2222,2222)  GIR=3 CN=6,5
A=1 1 3 15,37 37 105 43 472,334 2402 5204 16700 35640,55412 136224
E=2-3.0067 2-2.7357 2-1.4373 2-1.2431 2-.8017 2+.2969 2+1.2405 2+3.6871 8
K=(9,15 8)  -Q19 -D(Q5) 1/152

Q18  DEG=8 F=TVIS AUT=8  P=(1,8,8)  GIR=3 CN=6,6  T=1
A=1 3 3 5,21 55 43 231 624,1170 2432 4066 11514 33252,7306 134740
E=8-2.56155 8+1.56155 8  K=(12,12)  1/213

Q19  DEG=8 F=VI AUT=2  P=(1,2222,2222)  GIR=3 CN=5,6
A=1 3 3 5,23 15 5 3 214,1422 2674 5732 1562 22354,23750 43760
E=2-4.6871 2-2.2405 2-1.2969 2-.1983 2+.2431 2+.4373 2+1.7357 2+2.0067 8
K=(15 8,9)  -Q17 D(Q5) 1/143

Q20  DEG=8 F=VIS AUT=2  P=(1,2222,2222)  GIR=3 CN=5,5
A=1 3 5 13,21 11 27 17 714,662 2364 1552 13104 27042,70560 164350
E=2-4.02917 2-2.59037 2-.90996 2-.58521 2-.41479 2-.09004 2+1.59037 2+3.02917 8
K=(12 4,12 4)  1/305

Q21  DEG=8 F=VI AUT=2  P=(1,2222,2222)  GIR=3 CN=5,6
A=1 1 3 15,15 63 105 43 572,374 324 4452 6406 31206,75610 76620
E=2-3.32223 2-3.26849 2-2.00383 2-.14928 2+.17175 2+.61690 2+.97501 2+2.98017 8
K=(12 4,12)  -Q16 1/145

Q22  DEG=8 F=VI AUT=2  P=(1,2222,2222)  GIR=3 CN=4,6
A=1 3 5 13,5 3 1 1 774,772 764 752 10724 24652,52524 125252
E=2-5.41898 2-1.12173 2-.67658 2-.53621 2+.50866 2+.58809 2+.82969 2+1.82706 8
K=(18 16 5,6)  -Q23 D(Q10) D(Q11) -D(Q4) 1/216

Q23  DEG=8 F=VI AUT=2  P=(1,2222,2222)  GIR=3 CN=6,4
A=1 1 3 5,13 65 173 375 524,252 2052 1124 16012 35024,77004 177002
E=2-2.8271 2-1.8297 2-1.5881 2-1.5087 2-.4638 2-.3234 2+.1217 2+4.4190 8
K=(6,18 16 5)  -Q22 D(Q4) -D(Q10) -D(Q11) 1/126
```

TRANSITIVE GRAPHS ON 18 VERTICES

R1 DEG=0 F=XTVIAP P=(1,+) CN=1,18

R2 DEG=1 F=XTIP AUT=10321920 P=(1,1,+) CN=2,9 T=1
A=1 0 4 0,20 0 100 0 400,0 2000 0 10000 0,40000 0 200000

R3 DEG=2 F=XTIP AUT=1866240 P=(1,2,+) GIR=3 CN=3,6
A=1 3 0 10,0 30 40 0 240,400 0 2400 4000 0,24000 40000 240000 2[I2] 3[F3]
6[C2] 1/100 2/100 3/200 4/4000 5/1000

R4 DEG=2 F=XTIP AUT=576 P=(1,2,2,1,+) GIR=6 CN=2,9
A=1 1 4 2,30 0 100 0 400,0 1200 500 2000 0,40000 120000 42000 3[F4] B2*I2
C2*F2 1/10 2/20 3/6 4/14 5/12

R5 DEG=2 F=XTIP AUT=36 P=(1,2,2,2,2,+) GIR=9 CN=3,10
A=1 1 4 2,20 10 100 240 0,1000 0 0 0 12000,5000 30000 24000 2[I3] 1/20 4/10000

R6 DEG=2 F=TIAP AUT=2 P=(1,2,2,2,2,2,2,2,2,1) GIR=18 CN=2,9 POLYGON
A=1 1 4 2,20 10 100 40 400,200 2000 1000 10000 4000,40000 20000 300000
E=-2 2-1.87939 2-1.53209 2-1 2-.34730 2+.34730 2+1 2+1.53209 2+1.87939 2
K=(91 286 495 462 210 36 1,) B2*I3 1/200 4/401

R7 DEG=3 F=XTI AUT=124416 P=(1,3,2,+) GIR=4 CN=2,9 T=3
A=1 1 1 16,16 0 100 0 100,100 3200 3200 400 400,400 160000 160000 3[F5] F2[C1]
1/11 2/41 3/7 4/141 5/13

R8 DEG=3 F=XIP AUT=576 P=(1,12,2,+) GIR=3 CN=3,6
A=1 1 5 12,26 0 100 0 200,100 3200 3100 400 400,20000 140400 160000 3[F6]
W3(F2) B2XI2 C2XF2 1/101 2/11 3/201 4/4001 5/10040

R9 DEG=3 F=I AUT=2 P=(1,12,22,22,22,2) GIR=4 CN=2,9
A=1 1 1 12,6 10 4 240 120,200 100 5000 2400 2000,4000 150000 160000
E=-3 2-2.53209 2-1.34730 2-.87939 4+0 2+.87939 2+1.34730 2+2.53209 3
K=(73 180 225 146 49 8 1,) D(R6) 1/41 4/421

R10 DEG=3 F=IP AUT=2 P=(1,12,22,22,22,2) GIR=4 CN=3,9 PRISM
A=1 1 1 12,6 10 4 240 120,200 100 5000 2400 4000,42000 120000 250000
E=2-2.87939 2-2 2-.87939 2-.65270 2+0 2+.53209 1 2+1.3473D 2+2.53209 3
K=(73 180 225 146 49 8,) B2XI3 1/5 4/10001

R11 DEG=3 F=TIA AUT=12 P=(1,3,6,6,2) GIR=6 CN=2,9 T=3 PAPPUS GRAPH
A=1 1 1 10,4 2 4 10 2,500 440 220 1040 1020,300 32000 144000
E=-3 6-1.73205 4+0 6+1.73205 3 K=(73 178 210 116 35 8 1,) 3/22 5/620

R12 DEG=3 AUT=4 P=(1,12,22,24,4) GIR=3 CN=3,6
A=1 1 5 2,22 10 4 40 20,100 200 2100 4200 11000,20400 45000 102400
E=4-2 4-1.30278 4+0 1 4+2.30278 3 K=(72 166 165 52,1) W1(F5) 3/401

R13 DEG=3 AUT=1 P=(1/3/6/6/2) GIR=6 CN=2,9
A=1 1 1 10,10 2 4 2 4,1100 200 420 120 640,1040 124000 16000
E=-3 2-1.9696 2-1.7321 2-1.2856 2-.6840 2+.6840 2+1.2856 2+1.7321 2+1.9696 3
K=(73 178 210 117 35 8 1,) 4/61

R14 DEG=4 F=XTIP AUT=36864 P=(1,4,1,+) GIR=3 CN=3,6 T=1
A=1 1 7 7,36 0 100 0 100,1300 1300 7200 400 400,60400 60400 360000 3[F7] L(L7)
12[B1] 1/110 2/12 3/220 4/4014 5/10030

TRANSITIVE GRAPHS ON 18 VERTICES (CONTD)

R15 DEG=4 F=XTI AUT=576 P=(1,4,4,+) GIR=3 CN=3,6 T=1
A=1 3 1 11,24 12 154 162 0,1000 0 7000 2000 21000,74000 26000 245000 2[14]
L(L8) C2XF3 C2*F3 2/300 3/410 5/6000

R16 DEG=4 F=XI AUT=36 P=(1,22,22,+) GIR=3 CN=3,6
A=1 3 1 1,34 32 124 252 0,1000 0 2000 1000 26000,35000 36000 55000 2[15] 1/120
4/5000

R17 DEG=4 F=XI AUT=36 P=(1,22,22,+) GIR=3 CN=3,6
A=1 1 3 15,12 24 144 342 0,1000 0 2000 14000 36000,25000 13000 305000 2[16]
1/420 4/12000

R18 DEG=4 AUT=72 P=(1,13,233,23) GIR=4 CN=2,9
A=1 1 1 1,34 34 20 4 10,2 2 2 16100 16040,11600 3600 5600
E=-4 2-2.64575 6-1 6+1 2+2.64575 4 K=(58 114 115 69 28 8 1,) 3/106 4/622
5/720

R19 DEG=4 AUT=1 P=(1/4/8/5) GIR=4 CN=2,9
A=1 1 1 1,14 2 12 4 30,20 2 24 6440 5500,2700 12140 15200
E=-4 2-2.20893 2-1.62871 2-1.21157 2-1 2+1 2+1.21157 2+1.62871 2+2.20893 4
K=(58 112 105 62 28 8 1,) 4/621

R20 DEG=4 F=IAP AUT=2 P=(1,22,22,22,22,1) GIR=3 CN=3,6 ANTIPRISM
A=1 1 3 15,24 12 44 102 500,240 1400 2200 12000 5000,30000 144000 360000
E=2-2.22668 2-2 2-1.53209 2-1.18479 2-.34730 3+0 2+1.87939 2+3.41147 4
K=(55 84 35 1,3) 1/6 4/1003

R21 DEG=4 AUT=2 P=(1,22,2222,122) GIR=3 CN=3,6
A=1 3 1 1,4 42 20 10 12,24 1010 2020 740 4240,10500 106400 51200
E=2-3 2-2 4-1.30278 3+0 2+1 4+2.30278 4 K=(57 102 75 21,1) 3/1020

R22 DEG=4 F=I AUT=2 P=(1,22,2222,122) GIR=4 CN=2,9
A=1 1 1,24 12 14 22 20,10 2 4 3140 11600,6600 16040 15100
E=-4 2-2 2-1.87939 2-1.53209 2-.34730 2+.34730 2+1.53209 2+1.87939 2+2 4
K=(58 112 105 63 28 8 1,) B2*16 1/240 4/630

R23 DEG=4 F=I AUT=2 P=(1,22,2222,122) GIR=4 CN=3,9
A=1 1 1 1,2 4 24 12 120,50 122 4054 3000 20440,20300 102400 241200
E=2-3 2-2.87939 2-.87939 2-.65270 0 2+.53209 2+1 2+1.34730 2+2.53209 4
K=(58 112 95 29,) 1/30 4/1041

R24 DEG=4 F=I AUT=2 P=(1,22,222,122,2) GIR=4 CN=2,9
A=1 1 1 1,32 34 4 2 14,22 600 2400 1200 2440,1300 74000 134000
E=-4 2-2.87939 2-1 2-.65270 2-.53209 2+.53209 2+.65270 2+1 2+2.87939 4
K=(58 116 120 71 28 8 1,) B2*15 1/210 4/650

R25 DEG=4 F=I AUT=2 P=(1,22,2222,122) GIR=4 CN=3,9
A=1 1 1 1,24 12 4 2 14,22 2010 5020 740 10440,4300 102400 241200
E=2-3.41147 2-2 2-1.53209 2-.34730 3+0 2+1.18479 2+1.87939 2+2.22668 4
K=(58 112 100 43 7,) 1/22 4/1030

R26 DEG=4 F=IA AUT=2 P=(1,22,222,222,1) GIR=3 CN=3,6
A=1 1 1 11,24 12 4 2 54,122 240 500 12400 5200,40400 120200 314000
E=2-2.87939 2-2.53209 2-1.34730 2-.65270 0 2+.53209 2+.87939 2+1 2+3 4
K=(57 104 80 21,1) 1/102 4/4600

TRANSITIVE GRAPHS ON 18 VERTICES (CONTD)

R27 DEG=4 F=I AUT=4 P=(1,22,24,14,2) GIR=3 CN=3,6
A=1 1 1 11,4 2 22 24 212,414 140 1100 2040 10300,20440 144000 234000
E=2-3 4-2 5+0 4+1 2+3 4 K=(57 104 80 22,1) C2XF4 2/6 3/50 5/1005

R28 DEG=4 F=I AUT=512 P=(1,4,14,4,4) GIR=4 CN=3,9 T=1
A=1 1 1 1,36 30 6 6 30,600 1100 600 1100 24000,52000 124000 252000
E=2-3.75877 2-2 9+0 2+.69459 2+3.06418 4 K=(58 118 130 82 28 4,) I3[B1] 1/402
4/2401

R29 DEG=4 F=I AUT=8 P=(1,4,44,14) GIR=4 CN=2,9 T=1
A=1 1 1 1,10 2 20 4 30,6 14 22 740 14500,14240 3300 3440 E=-4 4-2 4-1 4+1 4+2 4
K=(58 112 105 64 28 8 1,) B2*I4 C2*F4 2/420 3/120 5/740

R30 DEG=5 F=XTI AUT=124416000 P=(1,5,+) GIR=3 CN=6,3 T=2
A=1 3 7 17,37 0 100 0 300,1300 3300 7300 400 20400,60400 160400 360400 3[F8]
F2[C2] I2[B2] 1/111 2/13 3/304 4/4414 5/1520

R31 DEG=5 F=I AUT=512 P=(1,14,4,4,4) GIR=3 CN=5,5
A=1 3 7 3,23 14 60 114 260,1200 500 3200 4500 24000,52000 164000 352000
E=2-2.75877 11-1 2+1.69459 2+4.06418 5 K=(40 32,6 2) I3[B2] 1/61 4/2106

R32 DEG=5 AUT=2 P=(1,122,22222,2) GIR=3 CN=3,6
A=1 1 5 1,21 50 24 330 344,10 4 2042 14022 2402,45002 116200 66100
E=2-3 4-2.30278 2-1 2+0 4+1.30278 2+2 3 5 K=(44 58 25 2,2) 3/411

R33 DEG=5 AUT=72 P=(1,23,233,13) GIR=4 CN=2,9
A=1 1 1 1,1 74 72 60 50,30 6 6 6 34300,33400 27400 17400
E=-5 2-2.64575 6-1 6+1 2+2.64575 5 K=(46 78 80 57 28 8 1,) 3/124 4/263 5/760

R34 DEG=5 AUT=1 P=(1/5/A/2) GIR=3 CN=3,6
A=1 1 5 1,31 10 22 202 604,140 60 2006 16402 1214,44120 13100 304500
E=2-2.7321 2-2.5634 2-1.6223 2-1.1953 -1 2+.2465 2+.7321 2+2.3169 2+2.8177 5
K=(43 50 10 1,3) 4/2051

R35 DEG=5 F=I AUT=2 P=(1,122,2222,22) GIR=3 CN=3,6
A=1 1 1 11,25 10 104 12 6,330 344 1042 10422 1200,40500 155000 162400
E=2-3 2-2.53209 2-1.34730 2-1 2-.53209 2+.65270 2+.87939 2+2.87939 3 5
K=(43 52 15 2,3) B2X16 1/405 4/3001

R36 DEG=5 F=I AUT=2 P=(1,122,2222,22) GIR=3 CN=3,6
A=1 1 1 1,21 50 124 254 134,42 2022 12 6 24200,52100 135000 72400
E=2-3.87939 2-1.87939 2-1.65270 2-.46791 2+0 2+.34730 2+1.53209 2+2 3 5
K=(45 68 45 12,1) B2X15 1/501 4/14001

R37 DEG=5 AUT=1 P=(1/5/8/4) GIR=4 CN=2,9
A=1 1 1 1,1 54 12 6 34,70 22 44 62 15300,31600 26500 16600
E=-5 2-2.20893 2-1.62871 2-1.21157 2-1 2+1 2+1.21157 2+1.62871 2+2.20893 5
K=(46 76 75 56 28 8 1,) 4/334

R38 DEG=5 F=N AUT=8 P=(1,14,444) GIR=3 CN=4,6
A=1 1 1 11,5 60 124 150 614,202 2402 1002 10102 14020,52040 64004 322010
E=8-2.30278 8+1.30278 3 5 K=(44 56 20,2)

R39 DEG=5 F=I AUT=8 P=(1,14,44,4) GIR=3 CN=3,6
A=1 1 1 11,5 60 124 150 614,42 22 2006 4012 14200,22400 171000 146100
E=4-3 4-1 4+0 4+2 3 5 K=(44 60 30 4,2) B2X14 C2XF6 2/301 3/211 5/3001

TRANSITIVE GRAPHS ON 18 VERTICES (CONTD)

R40 DEG=5 F=I AUT=2 P=(1,122,2222,22) GIR=4 CN=2,9
A=1 1 1 1,1 66 72 32 46,4 10 44 30 36400,37000 26600 17100
E=-5 2-2.87939 2-1 2-.65270 2-.53209 2+.53209 2+.65270 2+1 2+2.87939 5
K=(46 80 80 56 28 8 1,) O(R9) 1/203 4/703

R41 DEG=5 F=I AUT=2 P=(1,122,22222,2) GIR=3 CN=3,6
A=1 1 1 1,21 24 50 206 112,510 1204 4042 12022,230,144 165000 152400
E=2-3.53209 2-2.34730 2-1.87939 -1 2-.12061 2+.34730 2+1.53209 4+2 5
K=(45 64 35 6,1) D(R26) 1/301 4/4700

R42 DEG=5 F=I AUT=2 P=(1,122,2222,22) GIR=4 CN=3,9
A=1 1 1 1,1 72 66 46 32,10 2004 4030 2044 24400,53000 124600 53100
E=2-4.41147 5-1 2-.53209 2+.18479 2+.65270 2+1.22668 2+2.87939 5
K=(46 80 75 36 7,) 1/45 4/2130

R43 DEG=5 AUT=1 P=(1/5/7/5) GIR=3 CN=3,6
A=1 1 1 15,11 6 102 50 206,10 1066 2460 2400 22200,61100 120300 252400
E=2-3.1650 2-2.7321 -1 2-.5938 2-.4375 2-.3367 2+.7321 2+1.0313 2+3.5017 5
K=(43 56 25 1,3) 4/1121

R44 DEG=5 F=I AUT=6 P=(1,23,226,2) GIR=4 CN=3,9
A=1 1 1 1,1 70 70 104 202,1024 442 5014 422 21044,2412 124200 252100
E=2-4 4-1.87939 -1 4+.34730 4+1.53209 2+2 5 K=(46 72 50 14,) 1/15 4/2222

R45 DEG=5 AUT=1 P=(1/5/9/3) GIR=3 CN=3,6
A=1 3 5 11,21 40 6 340 202,1020 2460 14 3002 10110,41700 36000 270100
E=2-2.73205 4-1.79129 5-1 2+.73205 4+2.79129 5 K=(42 44 10 1,4) 3/1102

R46 DEG=5 AUT=1 P=(1/5/7/5) GIR=3 CN=3,6
A=1 1 1 15,15 2 10 74 42,220 1102 1106 200 26200,35100 22600 262100
E=2-2.9696 2-2.2856 2-1.6840 -1 2-.3160 2+.2679 2+.2856 2+.9696 2+3.7321 5
K=(42 48 20 3,4) 4/4620

R47 DEG=5 F=I AUT=12 P=(1,23,66) GIR=3 CN=3,6
A=1 3 1 1,1 40 120 310 20,1040 3010 2422 2214 21112,4242 14124 101444
E=6-2.73205 -1 6+.73205 4+2 5 K=(45 62 30 6,1) D(R11) 3/112 5/1026

R48 DEG=5 F=I AUT=8 P=(1,14,44,4) GIR=4 CN=2,9
A=1 1 1 1,1 62 16 16 62,44 50 24 30 35400,33200 26500 16300
E=-5 4-2 4-1 4+1 4+2 5 K=(46 76 75 56 28 8 1,) 2/23 3/47 5/325

R49 DEG=5 F=I AUT=2 P=(1,122,2222,22) GIR=4 CN=2,9
A=1 1 1 1,1 70 64 16 16,42 22 30 44 35200,32500 16600 27100
E=-5 2-2 2-1.87939 2-1.53209 2-.34730 2+.34730 2+1.53209 2+1.87939 2+2 5
K=(46 76 75 56 28 8 1,) 1/211 4/615

R50 DEG=5 F=I AUT=2 P=(1,122,2222,22) GIR=3 CN=4,6
A=1 1 1 11,25 10 4 244 130,6 12 2042 14022 25200,12500 103300 44700
E=2-3.22668 2-2.18479 5-1 2-.53209 2+.65270 2+2.41147 2+2.87939 5
K=(43 52 20,3) D(R10) D(R20) 1/7 4/1403

R51 DEG=5 F=A AUT=1 P=(1/5/8/1) GIR=4 CN=3,9
A=1 1 1 1,1 24 74 110 4,1602 1442 424 11002 20050,41022 120150 56100
E=2-3.8490 2-2.7321 -1 2-.9383 2+.0902 2+.7321 2+.8480 2+1.6329 2+2.2161 5
K=(46 72 50 13,) D(R13) 4/2602

TRANSITIVE GRAPHS ON 18 VERTICES (CONTD)

R52 DEG=5 AUT=2 P=(1,122,1222,1112) GIR=3 CN=3,6
A=1 1 5 5,31 74 2 202 412,1206 40 4020 14000 23600,14100 130400 324200
E=4-2.73205 5-1 2+.26795 4+.73205 2+3.73205 5 K=(42 48 20 2,4) 3/244 5/1007

R53 DEG=5 F=I AUT=24 P=(1,23,26,4) GIR=3 CN=3,6
A=1 3 1 1,1 70 70 44 14,1012 22 4024 442 26100,51500 26200 211600
E=2-4 9-1 6+2 5 K=(45 68 50 14,1) C2XF5 2/501 3/207 5/2441

R54 DEG=6 F=XT1 AUT=186624 P=(1,6,2,+) GIR=3 CN=3,6 T=1
A=1 1 1 17,17 17 176 176 0,1000 1000 1000 17000 17000,17000 176000 176000
2[17] -D(R139) F3[C1] 1/424 2/214 3/1600 4/13000 5/15000

R55 DEG=6 F=XI AUT=36 P=(1,222,2,+) GIR=3 CN=5,6
A=1 3 5 13,27 17 174 372 0,1000 1600 3000 6000 36000,37000 77000 175000 2[18]
1/504 4/15000

R56 DEG=6 AUT=72 P=(1,123,233,3) GIR=3 CN=6,3
A=1 1 5 15,35 75 12 206 100,1020 3040 602 10602 30602,27000 147000 317000
E=7-2 2-.64575 6+0 2+4.64575 6 K=(27,10 10 5 1) W3(C2) 3/246 4/4514 5/10071

R57 DEG=6 F=A AUT=1 P=(1/6/A/1) GIR=3 CN=4,6
A=1 1 1 1,31 21 44 116 402,1214 1624 2220 1016 1320,30152 50142 276000
E=2-4.08832 3-2 2-1.28142 2+0 2+.32052 2+.32955 2+1.97601 2+2.74366 6
K=(34 38 15,3) 4/1621

R58 DEG=6 AUT=1 P=(1/6/9/2) GIR=3 CN=5,5
A=1 1 1 5,11 75 100 2 402,650 640 5406 2270 1026,41036 54600 227200
E=2-3.50810 3-2 2-.86428 2-.67684 2-.25067 2+0 2+1.55887 2+3.74102 6
K=(31 24,6 2) 4/10407

R59 DEG=6 F=I AUT=2 P=(1,222,122222) GIR=3 CN=3,6
A=1 1 3 15,1 1 146 12 24,50 120 3504 15442 5310,42660 6504 207042
E=2-3.41147 2-3 2-1.87939 2-1 2+.34730 2+1.18479 2+1.53209 2 2+2.22668 6
K=(34 32 5 1,3) 1/64 4/3204

R60 DEG=6 F=I AUT=2 P=(1,222,122222) GIR=3 CN=3,6
A=1 1 3 15,1 1 146 50 120,12 24 7042 6504 5310,42660 13504 25442
E=2-3.41147 2-3 -2 2-1.53209 2-.34730 2+1 2+1.18479 2+1.87939 2+2.22668 6
K=(34 32 5 1,3) 1/442 4/10630

R61 DEG=6 F=A AUT=4 P=(1,24,2224,1) GIR=3 CN=5,6
A=1 3 5 15,3 43 30 140 660,710 6 4006 5440 12500,25220 52210 374000
E=9-2 4+0 4+3 6 K=(30 16,7 2) L(I4) 3/426

R62 DEG=6 AUT=2 P=(1,222,122222) GIR=3 CN=3,6
A=1 3 1 11,21 51 170 12 24,44 102 6440 7100 23414,15422 23204 214602
E=2-3 4-2.30278 4-1 4+1.30278 2 2+3 6 K=(32 26 5 1,5) 3/620

R63 DEG=6 F=I AUT=2 P=(1,222,12222,2) GIR=3 CN=3,6
A=1 3 5 13,1 1 36 50 520,544 1142 4104 12042 11110,20460 162600 155200
E=2-3.87939 2-1.87939 2-1.65270 2-1 2-.46791 2+.34730 2+1.53209 2 2+3 6
K=(33 32 15 3,4) 1/510 4/6404

R64 DEG=6 F=I AUT=2 P=(1,222,12222,2) GIR=3 CN=3,6
A=1 3 5 13,1 1 36 50 120,544 1142 4504 3042 11110,20460 162600 155200
E=2-3.87939 -2 2-1.65270 2-1.53209 2-.46791 2-.34730 2+1 2+1.87939 2+3 6
K=(33 32 15 3,4) 1/150 4/4017

TRANSITIVE GRAPHS ON 18 VERTICES (CONTD)

R65 DEG=6 F=IA AUT=4 P=(1,24,2224,1) GIR=3 CN=3,6
A=1 1 1 1,21 11 124 52 146,36 740 630 12104 12042,45024 25012 360600
E=2-4 2-3 2-1 6+0 5+2 6 K=(35 42 20 3,2) C2*F6 2/124 3/1406 5/5005

R66 DEG=6 F=I AUT=2 P=(1,222,222,122) GIR=3 CN=5,5
A=1 1 3 5,33 75 52 124 212,424 2404 1202 14000 31000,66000 171200 166400
E=2-2.53209 3-2 2-1.34730 2-1.22668 2-.18479 2+0 2+.87939 2+4.41147 6
K=(28 10,9 4) 1/230 4/10074

R67 DEG=6 F=I AUT=2 P=(1,222,2222,12) GIR=3 CN=4,6
A=1 1 3 5,23 55 152 164 202,404 2024 1012 11210 6420,17000 172000 365000
E=2-2.87939 2-2.53209 -2 2-1.34730 2-.65270 2+0 2+.53209 2+.87939 2+4 6
K=(30 22 5,7) 1/142 4/4303

R68 DEG=6 F=IA AUT=2 P=(1,222,22222,1) GIR=3 CN=5,6
A=1 1 5 3,25 13 150 360 22,1014 1420 2210 13002 7004,50244 24502 374000
E=2-2.53209 2-2.41147 3-2 2-1.34730 2+0 2+.87939 2+2.18479 2+3.22668 6
K=(31 22,6) 1/610 4/10146

R69 DEG=6 F=I AUT=2 P=(1,222,12222,2) GIR=3 CN=3,6
A=1 1 5 13,5 43 170 14 22,44 102 3404 15402 5320,2650 126400 257000
E=2-3 2-2.22668 2-1.87939 2-1.18479 2-1 2+.34730 2+1.53209 2 2+3.41147 6
K=(31 24 5 1,6) 1/406 4/3210

R70 DEG=6 F=I AUT=2 P=(1,222,12222,2) GIR=3 CN=3,6
A=1 1 3 5,15 23 170 44 102,24 12 3404 15402 5310,2660 126400 257000
E=2-3 2-2.22668 -2 2-1.53209 2-1.18479 2-.34730 2+1 2+1.87939 2+3.41147 6
K=(31 24 5 1,6) 1/602 4/10154

R71 DEG=6 F=I AUT=2 P=(1,222,2222,12) GIR=3 CN=3,6
A=1 1 1 11,23 55 42 104 72,134 604 4602 2414 1222,74000 151200 326400
E=2-3.06418 2-3 2-1 2-.69459 6+0 2 2+3.75877 6 K=(31 26 5 1,6) 1/26 4/3005

R72 DEG=6 F=IA AUT=2 P=(1,222,22222,1) GIR=3 CN=3,6
A=1 1 1 1,21 51 72 134 42,104 1204 6402 13014 7022,2454 1322 374000
E=2-3.75877 2-3 -2 6+0 2+.69459 2+1 2+3.06418 6 K=(34 38 15 1,3) 1/640
4/10123

R73 DEG=6 F=A AUT=1 P=(1/6/A/1) GIR=3 CN=5,5
A=1 1 1 11,35 45 30 2 422,630 2204 5042 504 21412,60704 15102 236200
E=2-3.09096 3-2 2-1.86164 2-.66781 2-.09662 2+0 2+2.55623 2+3.16080 6
K=(31 18,6 2) 4/1254

R74 DEG=6 F=IA AUT=2 P=(1,222,22222,1) GIR=3 CN=4,6
A=1 3 1 11,11 21 24 12 622,614 2144 1142 11050 26120,10304 104442 360600
E=2-3.22668 2-2.53209 2-2.18479 2-1.34730 2+0 2+.87939 3+2 2+2.41147 6
K=(33 30 5,4) 1/106 4/6420

R75 DEG=6 F=IA AUT=2 P=(1,222,22222,1) GIR=3 CN=3,6
A=1 3 1 1,1 1 142 144 134,72 264 4512 2224 21412,50060 124110 303600
E=2-4.41147 2-2.53209 2-1.34730 2+0 2+.18479 2+.87939 2+1.22668 3+2 6
K=(36 46 25 6,1) 1/700 4/14021

R76 DEG=6 F=I AUT=8 P=(1,24,144,2) GIR=3 CN=3,6
A=1 3 1 1,1 1 170 104 422,412 3044 1164 2154 4072,532 143200 234600
E=2-4.75877 6-1 2-.30541 2+0 3+2 2+2.06418 6 K=(36 52 35 9,1) -D(R66) 1/160
4/6110

TRANSITIVE GRAPHS ON 18 VERTICES (CONTD)

R77 DEG=6 AUT=2 P=(1,11112,122222) GIR=3 CN=3,6
A=1 3 3 15,1 1 36 60 120,1410 1410 4300 2240 22542,15142 32444 35104
E=2-3.64575 5-2 4+0 2+1 2+1.64575 2+3 6 K=(33 30 10 1,4) 3/33 5/2720

R78 DEG=6 F=I AUT=4 P=(1,24,224,12) GIR=3 CN=3,6
A=1 3 5 13,5 43 36 146 140,30 1500 2220 12210 5440,74000 163000 317000
E=2-3 5-2 6+0 2+1 2+4 6 K=(30 22 5 1,7) 2/640 3/70 5/4660

R79 DEG=6 AUT=1 P=(1/6/B) GIR=3 CN=3,6
A=1 1 1 1,31 21 120 12 426,504 214 2204 10152 4740,23212 17440 54026
E=2-3.6458 2-2.8794 -2 2-.8794 2-.6527 2+.5321 2+1.3473 2+1.6458 2+2.5321 6
K=(34 34 10 1,3) 4/2143

R80 DEG=6 AUT=1 P=(1/6/8/3) GIR=4 CN=2,9
A=1 1 1 1,1 1 164 142 72,134 66 154 16 132,76400 71600 27600
E=-6 2-1.9696 2-1.7321 2-1.2856 2-.6840 2+.6840 2+1.2856 2+1.7321 2+1.9696 6
K=(37 60 70 56 28 8 1,) 4/475

R81 DEG=6 F=I AUT=8 P=(1,24,1244) GIR=4 CN=3,9
A=1 1 1 1,1 1 170 204 202,1104 2442 2422 15014 11154,20562 5134 2472
E=2-4.75877 3-2 2-.30541 2+0 6+1 2+2.06418 6 K=(37 52 35 9,) D(R24) D(R51)
1/214 4/2132

R82 DEG=6 AUT=1 P=(1/6/B) GIR=3 CN=3,6
A=1 1 5 11,21 41 24 106 422,1640 2214 1032 1240 16500,20306 134002 260150
E=2-3.64575 3-2 4-1.30278 2+0 2+1.64575 4+2.30278 6 K=(33 30 10 1,4) 3/423

R83 DEG=6 F=A AUT=2 P=(1,222,22222,1) GIR=3 CN=3,6
A=1 1 1 11,1 41 120 50 246,506 664 712 1124 22052,1422 102214 374000
E=2-4 4-2.30278 4+0 4+1.30278 3+2 6 K=(35 40 15 2,2) 3/1030

R84 DEG=6 F=IA AUT=2 P=(1,222,22222,1) GIR=3 CN=3,6
A=1 1 1 11,21 11 56 326 40,1100 3064 3112 2044 21102,21224 42412 374000
E=2-4 2-2.53209 2-1.34730 2-.53209 2+0 2+.65270 2+.87939 2 2+2.87939 6
K=(34 38 15 2,3) 1/34 4/3014

R85 DEG=6 F=I AUT=2 P=(1,222,2222,12) GIR=4 CN=2,9
A=1 1 1 1,1 1 134 72 172,174 106 46 62 114,74600 76200 75400
E=-6 2-2.53209 2-1.34730 2-.87939 4+0 2+.87939 2+1.34730 2+2.53209 6
K=(37 62 70 56 28 8 1,) B2*18 1/212 4/770

R86 DEG=6 F=I AUT=16 P=(1,24,18,2) GIR=3 CN=3,6
A=1 3 1 1,31 31 170 102 14,1412 422 4024 11044 26042,11504 46600 331200
E=4-3 6-1 2+0 3+2 2+3 6 K=(32 28 10 2,5) C2XF7 2/144 3/250 5/6014

R87 DEG=6 F=I AUT=16 P=(1,24,128) GIR=3 CN=3,6
A=1 1 1 1,31 31 170 204 202,502 1024 6412 2422 21014,45104 130442 47044
E=4-3 3-2 2+0 6+1 2+3 6 K=(33 28 10 2,4) D(R27) 2/540 3/226 5/1350

R88 DEG=6 F=I AUT=12 P=(1,6,26,3) GIR=4 CN=2,9 T=1
A=1 1 1 1,1 1 52 124 154,132 66 74 162 116,33600 56600 65600
E=-6 6-1.73205 4+0 6+1.73205 6 K=(37 60 70 56 28 8 1,) 3/123 5/672

R89 DEG=6 AUT=1 P=(1/6/B) GIR=3 CN=4,6
A=1 1 5 1,11 45 154 102 120,404 2060 5006 2622 15430,15220 102412 223042
E=2-3.20893 2-2.62871 2-2.21157 -2 2+.21157 2+.62871 2+1 2+1.20893 2+3 6
K=(33 28 5,4) 4/4407

TRANSITIVE GRAPHS ON 18 VERTICES (CONTD)

R90 DEG=6 F=I AUT=31104 P=(1,6,26,3) GIR=4 CN=2,9 T=1
A=1 1 1 1,1 1 176 176 160,160 160 16 16 16,77000 77000 77000
E=-6 2-3 12+0 2+3 6 K=(37 66 75 57 28 8 1,) F4[C1] B2*17 C2*F5 1/242 2/62
3/125 4/636 5/752

R91 DEG=6 AUT=4 P=(1,222,1244) GIR=3 CN=3,6
A=1 3 1 11,21 11 36 204 202,1044 502 3104 4442 30520,31050 106450 47120
E=4-3 -2 4-1.30278 4+1 4+2.30278 6 K=(33 30 10 2,4) 3/460

R92 DEG=7 F=A AUT=1 P=(1/7/9/1) GIR=3 CN=3,6
A=1 1 1 15,1 15 1 374 56,214 2322 252 4204 33062,22342 31162 137400
E=2-4.8490 2-1.9383 2-.9098 2-.7321 2-.1520 2+.6329 1 2+1.2161 2+2.7321 7
K=(27 30 15 3,4) 4/14450

R93 DEG=7 AUT=72 P=(1,223,133,3) GIR=3 CN=6,3
A=1 3 5 13,7 47 147 36 300,1240 3140 430 10430 30430,67000 157000 337000
E=-3 6-2 2-.64575 6+0 2+4.64575 7 K=(18,13 10 5 1) 3/261 4/4551 5/10466

R94 DEG=7 AUT=1 P=(1/7/A) GIR=3 CN=5,5
A=1 1 5 15,5 45 1 270 206,1062 1430 4342 6502 10350,66406 3312 271220
E=2-4.08832 -3 2-2 2-1.28142 2+0 2+.32052 2+.32955 2+1.97601 2+2.74366 7
K=(25 16,6 2) D(R73) 4/2247

R95 DEG=7 AUT=2 P=(1,11122,112222) GIR=3 CN=3,6
A=1 1 5 5,5 31 51 6 412,254 134 5700 3700 26442,16422 61262 111162
E=2-3.64575 -3 4-2 4+0 2+1 2+1.64575 2+3 7 K=(24 14 5 1,7) 3/71 5/2271

R96 DEG=7 F=I AUT=2 P=(1,1222,22222) GIR=3 CN=4,6
A=1 1 1 5,11 31 145 350 324,1032 446 4072 2066 15410,23404 164202 352102
E=2-3.87939 -3 2-1.65270 2-1.53209 2-.46791 2-.34730 2+1 2+1.87939 2+3 7
K=(24 16 5,7) 1/303 4/4172

R97 DEG=7 AUT=1 P=(1/7/A) GIR=3 CN=5,6
A=1 1 5 5,11 31 141 350 406,12 1134 3064 2462 17222,13102 122604 324242
E=2-3.20893 -3 2-2.62871 2-2.21157 2+.21157 2+.62871 2+1 2+1.20893 2+3 7
K=(24 12,7) 4/4217

R98 DEG=7 AUT=1 P=(1/7/A) GIR=3 CN=3,6
A=1 1 5 11,1 45 61 150 222,1444 1+24 4072 2254 2126,31312 65502 56602
E=2-3.7321 2-2.8177 2-2.3169 2-.2679 2-.2465 1 2+1.1953 2+1.6223 2+2.5634 7
K=(25 18 5 1,6) 4/3444

R99 DEG=7 AUT=1 P=(1/7/A) GIR=3 CN=5,6
A=1 3 5 1,31 13 25 220 560,62 604 4310 16450 7046,57120 32602 201516
E=4-2.79129 4-2 2-.73205 1 4+1.79129 2+2.73205 7 K=(23 10,8) 3/622

R100 DEG=7 AUT=2 P=(1,11122,112222) GIR=3 CN=3,6
A=1 1 5 1,21 41 121 6 772,650 2530 4610 12510 24026,52046 120126 250246
E=4-3.73205 2-.73205 4-.26795 5+1 2+2.73205 7 K=(26 24 10 2,5) 3/254 5/14502

R101 DEG=7 F=I AUT=6 P=(1,223,226) GIR=3 CN=6,3
A=1 3 1 1,7 47 147 34 32,1024 2412 3120 4610 33060,24510 153220 134450
E=4-2.87939 2-2 4-.65270 4+.53209 1 2+4 7 K=(21,10 10 5 1) 1/115 4/14141

R102 DEG=7 F=I AUT=2 P=(1,1222,22222) GIR=3 CN=5,5
A=1 1,1 5,11 65 171 250 124,1016 416 3042 4422 34102,72202 65450 113424
E=3-3 2-2.22668 2-1.53209 2-1.18479 2-.34730 2+1 2+1.87939 2+3.41147 7
K=(22 4,9 4) 1/461 4/2456

TRANSITIVE GRAPHS ON 18 VERTICES (CONTD)

R103 DEG=7 AUT=4 P=(1,124,2224) GIR=3 CN=4,6
A=1 1 5 11,11 65 65 374 374,1002 2402 6010 6004 34102,72202 134042 272022
E=4-3.30278 4-1 4+.30278 4+1 5 7 K=(22 18 5,9) D(R12) 3/611

R104 DEG=7 F=I AUT=6 P=(1,223,226) GIR=3 CN=3,6
A=1 3 5 3,1 1 1 10 420,1762 1754 724 664 564,31312 51152 61252
E=2-5 4-1.53209 4-.34730 3+1 4+1.87939 7 K=(28 32 15 2,3) D(R44) D(R84) 1/35
4/11222

R105 DEG=7 F=I AUT=2 P=(1,1222,22222) GIR=3 CN=5,5
A=1 1 5 7,13 23 43 216 516,1024 450 6240 16120 24120,52240 164610 153104
E=2-2.87939 2-2.41147 4-2 2-.65270 2+.53209 1 2+2.18479 2+3.22668 7
K=(22 8,9 2) 1/423 4/3442

R106 DEG=7 F=I AUT=2 P=(1,1222,22222) GIR=3 CN=5,5
A=1 1 5 7,13 23 43 120 240,216 2116 5024 2450 31520,31640 63610 115504
E=-3 2-2.53209 2-2.41147 2-2 2-1.34730 2+0 2+.87939 2+2.18479 2+3.22668 7
K=(22 8,9 2) 1/443 4/10315

R107 DEG=7 F=I AUT=2 P=(1,1222,22222) GIR=3 CN=6,3
A=1 3 7 17,37 1 1 102 202,1520 1640 2710 5304 25220,12540 165210 152504
E=-3 2-2.87939 2-2.53209 2-1.34730 2-.65270 2+0 2+.53209 2+.87939 2+4 7
K=(21,10 10 5 1) 1/311 4/4435

R108 DEG=7 AUT=1 P=(1/7/A) GIR=3 CN=3,6
A=1 1 1 5,21 15 51 54 22,1424 3050 1744 5216 32302,1562 44132 306602
E=2-3.6458 -3 2-2.8794 2-.8794 2-.6527 2+.5321 2+1.3473 2+1.6458 2+2.5321 7
K=(25 18 5 1,6) D(R34) 4/2155

R109 DEG=7 F=A AUT=1 P=(1/7/9/1) GIR=3 CN=5,5
A=1 1 1 5,11 55 135 264 202,1012 3022 3520 11424 152,44056 166042 77400
E=2-3.50810 -3 2-2 2-.86428 2-.67684 2-.25067 2+0 2+1.55887 2+3.74102 7
K=(22 10,9 4) 4/10247

R110 DEG=7 AUT=4 P=(1,1222,244) GIR=3 CN=5,5
A=1 3 7 1,1 63 163 16 16,620 1140 4540 3220 35050,16444 67030 132424
E=-3 8-2 4+0 4+3 7 K=(21 2,10 4) 3/1122

R111 DEG=7 F=I AUT=2 P=(1,1222,2222,2) GIR=3 CN=5,5
A=1 1 5 11,25 55 35 370 764,12 2006 4042 12022 26202,16102 175000 372400
E=2-3.53209 2-2.34730 2-1.53209 2-1 2-.34730 2-.12061 2+1 2+1.87939 5 7
K=(21 12,10 4) B2XI8 1/125 4/7004

R112 DEG=7 F=I AUT=2 P=(1,1222,22222) GIR=3 CN=5,6
A=1 1 1 5,31 41 121 350 324,1216 516 3042 14422 25050,12424 160212 350106
E=2-4.06418 4-2 2-1.69459 7+1 2+2.75877 7 K=(25 16,6) 1/445 4/12250

R113 DEG=7 F=I AUT=144 P=(1,16,26,2) GIR=4 CN=2,9
A=1 1 1 1,1 1 1 374 374,172 346 316 326 272,76 177000 176400
E=-7 2-2 6-1 6+1 2+2 7 K=(31 56 70 56 28 8 1,) 1/243 2/423 3/161 4/676 5/774

R114 DEG=7 F=I AUT=2 P=(1,1222,22222) GIR=3 CN=5,6
A=1 1 1 5,11 31 45 310 704,1050 2424 5016 2416 11162,20662 66222 116142
E=2-3.41147 3-3 2-1.53209 2-.34730 2+1 2+1.18479 2+1.87939 2+2.22668 7
K=(25 16,6) D(R68) 1/611 4/1623

TRANSITIVE GRAPHS ON 18 VERTICES (CONTD)

R115 DEG=7 F=I AUT=2 P=(1,1222,22222) GIR=3 CN=4,6
A=1 1 5 1,21 21 41 310 304,1252 2526 1152 10626 5450,3424 160146 150232
E=2-4.22668 2-3.18479 2-1.53209 2-.34730 5+1 2+1.41147 2+1.87939 7
K=(27 24 5,4) D(R74) 1/107 4/6052

R116 DEG=7 F=I AUT=4 P=(1,124,2224) GIR=3 CN=5,6
A=1 1 5 5,11 31 45 254 134,1240 520 6012 16006 25302,22462 55062 112702
E=5-3 2-2 2+0 6+1 2+3 7 K=(24 12,7) 2/47 3/74 5/2266

R117 DEG=7 F=A AUT=2 P=(1,1222,111222,1) GIR=3 CN=3,6
A=1 1 1 13,7 7 13 60 14,1314 3120 3240 11650 5524,4632 10546 374400
E=2-3.73205 4-2 4-.73205 2-.26795 1 4+2.73205 7 K=(23 14 5 1,8) -D(R52)
3/1422 5/14602

R118 DEG=7 F=I AUT=2 P=(1,1222,2222,2) GIR=3 CN=5,5
A=1 1 1 13,27 33 147 132 246,430 1044 6010 16004 25204,12510 175000 372400
E=2-2.87939 4-2 2-1.22668 2-.65270 2-.18479 2+.53209 1 2+4.41147 7
K=(19 4,12 6) 1/461 4/12106

R119 DEG=7 F=I AUT=2 P=(1,1222,2222,2) GIR=3 CN=5,5
A=1 1 1 7,13 73 67 152 226,510 1204 6010 16004 25024,12450 175000 372400
E=-3 2-2.53209 2-2 2-1.34730 2-1.22668 2-.18479 2+0 2+.87939 2+4.41147 7
K=(19 4,12 6) 1/245 4/2346

R120 DEG=7 AUT=1 P=(1/7/A) GIR=3 CN=5,6
A=1 3 1 5,15 2: 105 324 122,6 1250 3450 6112 24640,62170 57022 13612
E=2-3.5634 2-2.6223 2-2.1953 2-.7535 2-.7321 1 2+1.3169 2+1.8177 2+2.7321 7
K=(24 12,7) 4/5045

R121 DEG=7 F=I AUT=16 P=(1,124,28) GIR=3 CN=6,3
A=1 1 1 3,23 63 163 16 16,1210 504 7030 4604 13110,64424 73050 126444
E=3-3 4-2 6+0 2+1 2+4 7 K=(21,10 10 5 1) 2/621 3/307 5/2613

R122 DEG=7 AUT=1 P=(1/7/A) GIR=3 CN=3,6
A=1 1 1 11,21 55 11 250 406,106 1102 7620 7620 366,26406 46056 111270
E=2-3.7321 2-3.5017 2-1.0313 2-.2679 2+.3367 2+.4375 2+.5938 1 2+3.1650 7
K=(25 20 5 1,6) 4/12212

R123 DEG=7 F=I AUT=8 P=(1,124,244) GIR=3 CN=5,5
A=1 1 5 3,3 43 23 6 412,1330 744 3270 4564 21030,50444 142504 345210
E=2-3.75877 6-2 2+.69459 5+1 2+3.06418 7 K=(24 16,7 2) 1/161 4/6460

R124 DEG=7 F=I AUT=8 P=(1,124,244) GIR=3 CN=5,5
A=1 1 1 3,3 43 23 16 16,1330 744 3270 4564 21210,50504 142444 345030
E=2-3.75877 3-3 6+0 2+.69459 2+1 2+3.06418 7 K=(25 16,6 2) 1/215 4/10654

R125 DEG=7 AUT=1 P=(1/7/A) GIR=3 CN=3,6
A=1 3 1 11,1 25 41 310 216,74 1624 6452 10322 21150,3542 62604 344062
E=2-3.73205 4-2.79129 2-.26795 5+1 4+1.79129 7 K=(26 20 5 1,5) 3/512

R126 DEG=7 F=I AUT=240 P=(1,25,A) GIR=3 CN=6,3
A=1 3 1 11,31 71 171 204 12,1414 1022 6424 5042 32444,25102 152504 125602
E=10-2 5+1 2+4 7 K=(20,11 10 5 1) C20F8 -C2*F8 2/113 3/704 5/14441

R127 DEG=7 F=I AUT=2 P=(1,1222,22222) GIR=3 CN=4,6
A=1 1 5 1,1 11 5 350 324,1052 2426 5050 2424 21272,10566 34342 32322
E=2-4.75877 -3 2-2 2-.30541 2+0 6+1 2+2.06418 7 K=(28 28 10,3) D(R57) D(R72)
1/47 4/1546

TRANSITIVE GRAPHS ON 18 VERTICES (CONTD)

R128 DEG=7 AUT=4 P=(1,124,2224) GIR=3 CN=5,6
A=1 1 5 11,5 31 45 250 124,16 2016 5620 3540 25302,12702 113062 64462
E=5-3 4-1.30278 4+1 4+2.30278 7 K=(24 12,7 2) D(R61) 3/427

R129 DEG=7 F=I AUT=2 P=(1,1222,22222) GIR=3 CN=3,6
A=1 1 5 1,1 1 1 366 372,352 326 4450 13024 24250,52124 120252 250126
E=2-5.41147 2-1.53209 2-.81521 2-.34730 2+.22668 5+1 2+1.87939 7
K=(30 40 25 6,1) D(R41) D(R75) 1/701 4/6244

R130 DEG=7 F=I AUT=2 P=(1,1222,2222,2) GIR=4 CN=2,9
A=1 1 1 1,1 1 1 372 366,156 236 346 332 274,174 176400 177000
E=-7 2-1.87939 2-1.53209 2-1 2-.34730 2+.34730 2+1 2+1.53209 2+1.87939 7
K=(31 56 70 56 28 8 1,) 1/53 4/537

R131 DEG=7 AUT=1 P=(1/7/A) GIR=3 CN=3,6
A=1 1 5 7,31 41 101 34 602,1062 1510 306 12604 16042,72510 45216 25360
E=2-3.64575 -3 2-2 4-1.30278 2+0 2+1.64575 4+2.30278 7 K=(24 14 5 1,7) 3/1061

R132 DEG=7 F=I AUT=144 P=(1,16,26,2) GIR=3 CN=3,6
A=1 1 1 15,21 55 55 374 374,202 2006 2042 2012 34022,34102 177000 176400
E=2-4 2-2 6-1 6+1 5 7 K=(22 20 10 2,9) -D(R93) B2XI7 1/425 2/215 3/1411
4/13200 5/7100

R133 DEG=7 F=A AUT=1 P=(1/7/9/1) GIR=3 CN=5,5
A=1 3 1 5,21 51 117 130 6,1460 1210 2534 3062 24540,15016 64242 347400
E=2-3.09096 -3 2-2 2-1.86164 2-.66781 2-.09662 2+0 2+2.55623 2+3.16080 7
K=(22 10,9 2) 4/10354

R134 DEG=7 F=A AUT=1 P=(1/7/9/1) GIR=3 CN=4,6
A=1 3 1 15,15 5 101 350 252,6 74 2322 7022 16520,3342 70610 327400
E=2-4.1650 2-1.5938 2-1.4375 2-1.3367 2-.7321 2+.0313 1 2+2.5017 2+2.7321 7
K=(24 18 5,7) -D(R43) 4/5424

R135 DEG=7 F=I AUT=24 P=(1,34,226) GIR=3 CN=3,6
A=1 1 1 1,1 41 21 240 120,1716 1476 1254 1252 20534,10532 141246 30526
E=2-5 4-2 11+1 7 K=(29 32 15 2,2) D(R32) D(R65) D(R83) 2/125 3/1504 5/14520

R136 DEG=7 F=A AUT=1 P=(1/7/9/1) GIR=3 CN=3,6
A=1 3 5 13,11 11 161 350 26,340 3500 1024 14006 22540,77002 10276 77400
E=2-3.7321 2-2.2161 2-1.6329 2-.8480 2-.2679 2-.0902 2+.9383 1 2+3.8490 7
K=(22 16 5 1,9) -D(R46) 4/12302

R137 DEG=8 F=XTI P=(1,8,+) GIR=3 CN=9,2 T=2
A=1 3 7 17,37 77 177 377 0,1000 3000 7000 17000 37000,77000 177000 377000
2[19] SW(19) F3[C2] 1/524 2/314 3/1610 4/17000 5/17000

R138 DEG=8 AUT=1 P=(1/8/9) GIR=3 CN=5,5
A=1 1 3 5,35 41 43 141 204,624 3512 7112 12724 15224,63252 41532 201536
E=2-4.50810 2-1.86428 2-1.67684 2-1.25067 3+0 2+.55887 2+2 2+2.74102 8
K=(18 8,10 2) 4/14207

R139 DEG=8 F=I AUT=31104 P=(1,26,6,3) GIR=3 CN=6,3
A=1 3 7 17,7 37 47 247 640,1640 3640 130 10130 30130,77000 177000 377000
E=-4 2-1 2+5 8 K=(9,19 20 10 2) SW(I2) -D(R132) -D(R172) -D(R21) -D(R53)
F4[C2] 1/342 2/66 3/170 4/4363 5/4336

TRANSITIVE GRAPHS ON 18 VERTICES (CONTD)

R140 DEG=8 AUT=1 P=(1/8/9) GIR=3 CN=5,5
A=1 1 5 15,15 51 65 221 724,156 406 7420 14302 15612,22512 175042 126162
E=-4 2-3.1650 2-2.7321 2-.5938 2-.4375 2-.3367 2+.7321 2+1.0313 2+3.5017 8
K=(16 4,12 6) 4/10732

R141 DEG=8 F=I AUT=2 P=(1,2222,12222) GIR=3 CN=5,5
A=1 3 5 13,5 43 33 35 146,350 2560 626 10616 23300,55440 157120 167050
E=2-3.53209 2-2.34730 2-2 2-1.53209 2-.34730 2-.12061 2+1.87939 2+2 4 8
K=(15 6,13 4) -D(R119) 1/134 4/7220

R142 DEG=8 AUT=1 P=(1/8/9) GIR=3 CN=5,5
A=1 1 5 1,5 55 65 361 132,222 3154 2122 15414 2672,33052 52426 335202
E=2-3.74102 2-3 2-1.55887 2-1 0 2+.25067 2+.67684 2+.86428 2+3.50810 8
K=(16 4,12 6) 4/12213

R143 DEG=8 AUT=1 P=(1/8/9) GIR=3 CN=3,6
A=1 1 1 11,5 5 153 21 764,1512 1112 2224 14562 16456,30550 106076 114626
E=2-4.64575 4-2.30278 3+0 2+.64575 4+1.30278 2+2 8 K=(20 14 5 1,8) D(R45)
3/433

R144 DEG=8 AUT=1 P=(1/8/9) GIR=3 CN=6,3
A=1 1 1 5,25 15 65 275 312,222 2402 3514 15130 6072,46342 35152 167006
E=-4 2-2.9696 2-2.2856 2-1.6840 2-.3160 2+.2679 2+.2856 2+.9696 2+3.7321 8
K=(15,13 10 5 1) 4/4655

R145 DEG=8 F=I AUT=2 P=(1,2222,12222) GIR=3 CN=5,6
A=1 3 5 3,3 5 103 45 630,1054 1122 4374 12572 6720,46650 103322 245454
E=2-4.41147 2-3 2-1 2-.87939 0 2+.18479 2+1.22668 2+1.34730 2+2.53209 8
K=(19 10,9) 1/614 4/11231

R146 DEG=8 F=I AUT=2 P=(1,2222,12222) GIR=3 CN=5,6
A=1 3 5 13,11 21 61 111 36,254 2522 714 10662 15644,23702 127144 57142
E=2-3.53209 2-3.41147 2-2.34730 2-.12061 3+0 2+1.18479 2+2 2+2.22668 8
K=(18 6,10) 1/132 4/14231

R147 DEG=8 F=N AUT=2 P=(1,2222,12222) GIR=3 CN=5,6
A=1 3 5 3,21 51 111 261 146,454 322 1624 11612 17244,27502 116134 66072
E=4-3 4-2.30278 0 4+1.30278 4+2 8 K=(17 6,11 2)

R148 DEG=8 AUT=2 P=(1,2222,12222) GIR=3 CN=3,6
A=1 3 1 11,21 51 55 123 146,512 264 674 732 17054,27122 117404 267202
E=2-4 4-2.30278 2-1 3+0 4+1.30278 2+3 8 K=(17 12 5 1,11) 3/1070

R149 DEG=8 F=I AUT=2 P=(1,2222,12222) GIR=3 CN=5,5
A=1 3 1 1,31 71 115 263 606,334 472 5042 3104 35014,73022 72254 134522
E=2-3.53209 2-2.34730 2-2.22668 2-1.18479 2-.12061 3+0 2+2 2+3.41147 8
K=(15 6,13 4) -D(R118) -D(R71) 1/550 4/6306

R150 DEG=8 AUT=1 P=(1/8/9) GIR=3 CN=6,3
A=1 1 5 15,35 3 175 7 612,1462 1300 4504 16142 7422,74124 53412 334150
E=2-3 4-2.30278 2-1.64575 2-1 0 4+1.30278 2+3.64575 8 K=(14,14 10 5 1) 3/1305

R151 DEG=8 F=I AUT=2 P=(1,2222,12222) GIR=3 CN=5,5
A=1 3 7 7,11 61 23 215 146,1342 1544 632 10634 26300,56440 165050 353120
E=2-3.22668 2-2.87939 2-2.18479 2-1 2-.65270 2+.53209 2+1 2+2.41147 4 8
K=(15 6,13 4) 1/324 4/15003

TRANSITIVE GRAPHS ON 18 VERTICES (CONTD)

R152 DEG=8 AUT=1 P=(1/8/9) GIR=3 CN=6,3
A=1 3 5 15,1 35 45 135 650,452 2006 5342 11250 35360,26122 106642 327022
E=2-3.8794 2-1.8794 2-1.6527 2-1.6458 2-.4679 0 2+.3473 2+1.5321 2+3.6458 8
K=(15,13 10 5 1) 4/5622

R153 DEG=8 F=I AUT=2 P=(1,2222,12222) GIR=3 CN=5,5
A=1 3 1 1,5 43 107 47 630,764 2752 5024 13012 21134,51072 130530 270270
E=2-4.41147 2-2.87939 2-1 2-.65270 2+.18479 2+.53209 2+1 2+1.22668 4 8
K=(18 10,10 4) 1/522 4/15011

R154 DEG=8 F=I AUT=2 P=(1,2222,12222) GIR=3 CN=5,5
A=1 1 5 3,35 33 61 111 36,410 2220 7226 7416 2744,44742 127302 57444
E=-4 2-3.22668 2-2.18479 4-1 2-.53209 2+.65270 2+2.41147 2+2.87939 8
K=(16 6,12 4) 1/72 4/2725

R155 DEG=8 F=I AUT=2 P=(1,2222,12222) GIR=3 CN=5,6
A=1 1 5 3,35 33 61 311 36,1102 3044 5226 3416 22650,54720 66244 316502
E=2-3.22668 2-2.53209 2-2.18479 2-1.34730 2-1 0 2+.87939 2+2.41147 2+3 8
K=(15 2,13 4) -D(R23) 1/702 4/5243

R156 DEG=8 F=I AUT=4 P=(1,224,1224) GIR=3 CN=3,6
A=1 3 5 13,5 43 43 305 36,746 746 630 170 35220,75410 133120 273050
E=2-4 4-2 4-1 4+1 2+2 4 8 K=(16 10 5 1,12) -D(R78) 2/614 3/1413 5/7600

R157 DEG=8 F=I AUT=2 P=(1,2222,12222) GIR=3 CN=5,5
A=1 3 7 7,1 1 25 13 170,764 752 1544 11342 25504,13242 164530 152270
E=2-4.41147 2-4 4-1 2-.53209 2+.18479 2+.65270 2+1.22668 2+2.87939 8
K=(19 10,9 4) D(R109) 1/216 4/10764

R158 DEG=8 F=IA AUT=2 P=(1,2222,2222,1) GIR=3 CN=5,5
A=1 3 5 13,5 43 47 107 742,1744 530 270 15120 36050,50234 124432 377000
E=2-4.06418 2-1.69459 8-1 2+1 2+2.75877 4 8 K=(15 8,13 4) SW(18) -D(R180)
1/544 4/7120

R159 DEG=8 F=I AUT=2 P=(1,2222,12222) GIR=3 CN=5,6
A=1 1 5 13,11 61 13 25 170,1700 1640 4346 2546 23246,15506 126232 56434
E=-4 2-3.53209 2-2.34730 2-1.87939 2-.12061 2+.34730 2+1.53209 4+2 8
K=(18 6,10) 1/152 4/4467

R160 DEG=8 F=I AUT=2 P=(1,2222,12222) GIR=3 CN=3,6
A=1 1 5 13,3 45 101 241 170,524 252 726 656 27224,57412 17264 27512
E=2-4 2-3.41147 2-1.87939 3+0 2+.34730 2+1.18479 2+1.53209 2+2.22668 8
K=(19 14 5 1,9) D(R69) 1/226 4/3162

R161 DEG=8 F=I AUT=2 P=(1,2222,12222) GIR=3 CN=3,6
A=1 3 1 1,13 65 111 261 146,524 252 672 734 27224,17412 117024 267012
E=2-4 2-3 4-1 5+0 2+2 2+3 8 K=(17 10 5 1,11) 2/252 5/11350

R162 DEG=8 F=I AUT=2 P=(1,2222,12222) GIR=3 CN=3,6
A=1 1 5 3,25 53 121 251 36,754 762 322 454 35024,73012 133404 275202
E=2-4 2-2.22668 2-1.87939 2-1.18479 3+0 2+.34730 2+1.53209 2+3.41147 8
K=(16 10 5 1,12) 1/644 4/12606

R163 DEG=8 F=I AUT=2 P=(1,2222,12222) GIR=3 CN=5,5
A=1 1 5 3,27 57 5 203 740,232 2434 4114 12062 33224,35412 115660 63710
E=2-3.22668 2-3 2-2.18479 2-1 2-.87939 0 2+1.34730 2+2.41147 2+2.53209 8
K=(16 2,12 4) 1/234 4/3314

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R164 DEG=8 AUT=2 P=(1,111122,12222) GIR=3 CN=6,3
A=1 3 5 13,11 51 151 351 36,1120 3060 7520 17260 2506,44246 164206 352406
E=4-3 2-1.64575 4-1 3+0 2+2 2+3.64575 8 K=(14,14 10 5 1) 3/315 5/3225

R165 DEG=8 F=I AUT=2 P=(1,2222,12222) GIR=3 CN=3,6
A=1 3 5 13,5 43 43 305 170,434 232 746 746 27220,57410 117120 267050
E=2-4 2-2 2-1.87939 2-1.53209 2-.34730 2+.34730 2+1.53209 2+1.87939 4 8
K=(16 10 5 1,12) -D(R67) 1/464 4/13003

R166 DEG=8 AUT=2 P=(1,2222,12222) GIR=3 CN=5,6
A=1 3 5 13,5 43 13 225 146,636 636 5060 13110 34540,32340 151520 361250
E=4-3.30278 2-2 2-1 4+.30278 2+1 2+2 4 8 K=(16 8,12) 3/1230

R167 DEG=8 F=I AUT=6 P=(1,26,2223) GIR=3 CN=3,6
A=1 1 3 3,25 3 15 105 134,642 640 4130 5770 12770,17146 17416 17226
E=3-4 4-1.87939 4+.34730 4+1.53209 2+2 8 K=(19 14 5 1,9) D(R70) 1/642 4/10555

R168 DEG=8 AUT=2 P=(1,11222,111222) GIR=3 CN=6,3
A=1 1 5 15,21 51 35 235 602,1170 2144 5022 15012 26542,56342 31306 231446
E=-4 4-2.73205 4-1 2+.26795 4+.73205 2+3.73205 8 K=(15,13 10 5 1) 3/265
5/10770

R169 DEG=8 AUT=1 P=(1/8/9) GIR=3 CN=5,5
A=1 3 5 11,21 57 161 171 620,1006 2012 7240 17240 34016,44536 67006 213660
E=2-3 2-2.74366 2-1.97601 2-1 2-.32955 2-.32052 0 2+1.28142 2+4.08832 8
K=(13 2,15 8) 4/3126

R170 DEG=8 F=I AUT=2 P=(1,2222,12222) GIR=3 CN=5,6
A=1 3 3 5,23 55 5 3 630,572 374 3204 15402 21264,51512 132650 74720
E=2-4.41147 2-2.53209 2-1.34730 2-1 0 2+.18479 2+.87939 2+1.22668 2+3 8
K=(18 10,10) 1/306 4/6550

R171 DEG=8 F=I AUT=2048 P=(1,8,18) GIR=3 CN=3,6 T=1
A=1 1 7 1,7 21 101 221 776,550 226 6270 6270 6506,70550 70226 306506
E=4-4 9+0 4+2 8 K=(20 20 10 2,8) D(R86) I4[B1] C2*F7 2/624 3/313 5/5452

R172 DEG=8 F=IA AUT=144 P=(1,26,26,1) GIR=3 CN=3,6
A=1 1 1 1,31 41 131 131 774,772 606 4116 4126 4036,70446 70246 377000
E=2-5 8-1 6+1 4 8 K=(19 20 10 2,9) SW(17) -D(R56) 1/434 2/134 3/1603 4/13014
5/70550

R173 DEG=8 F=TIA AUT=40320 P=(1,8,8,1) GIR=4 CN=2,9 T=2
A=1 1 1 1,1 1 1 1 774,772 766 756 736 676,576 376 377000 E=-8 8-1 8+1 8
K=(28 56 70 56 28 8 1,) SW(I1) -W9(B2) -B2XI9 B2*I9 1/252 2/462 3/163 4/776
5/377

R174 DEG=8 AUT=1 P=(1/8/9) GIR=3 CN=3,6
A=1 1 1 15,1 55 45 121 374,256 416 3402 16300 34472,34262 123446 14732
E=2-4.6458 2-2.5321 2-1.3473 2-.5321 0 2+.6458 2+.6527 2+.8794 2+2.8794 8
K=(19 14 5 1,9) D(R136) 4/3262

R175 DEG=8 F=I AUT=512 P=(1,44,144) GIR=3 CN=3,6
A=1 3 5 13,1 1 1 1 776,764 752 752 764 14624,62152 114624 262152
E=2-5.75877 2-1.30541 9+0 2+1.06418 2+2 8 K=(24 28 15 3,4) D(R63) O(R64)
D(R76) D(R92) -D(R31) I5[B1] 1/314 4/6245

TRANSITIVE GRAPHS ON 18 VERTICES (CONTD)

R176 DEG=8 AUT=1 P=(1/8/9) GIR=3 CN=5,5
A=1 1 7 15,21 61 7 251 460,1216 206 7500 17114 4672,51720 16146 325142
E=2-3.16080 2-3 2-2.55623 2-1 0 2+.09662 2+.66781 2+1.86164 2+3.09096 8
K=(16 6,12 2) 4/3312

R177 DEG=8 AUT=1 P=(1/8/9) GIR=3 CN=5,5
A=1 3 5 1,21 7 55 221 550,1044 2152 2232 15330 5530,72426 6762 53446
E=2-4.09096 2-2.86164 2-1.66781 2-1.09662 3+0 2+1.55623 2+2 2+2.16080 8
K=(18 10,10 2) 4/5701

R178 DEG=8 AUT=1 P=(1/8/9) GIR=3 CN=5,5
A=1 1 5 15,27 1 105 163 330,642 36 7606 6014 33312,27500 124152 321360
E=-4 2-2.7321 2-2.5634 2-1.6223 2-1.1953 2+.2465 2+.7321 2+2.3169 2+2.8177 8
K=(16 4,12 4) 4/2754

R179 OEG=8 AUT=2 P=(1,2222,12222) GIR=3 CN=5,5
A=1 1 5 13,23 55 41 301 740,522 254 6246 6506 27224,17412 111434 261232
E=6-3 2-1 3+0 6+2 8 K=(17 4,11 2) 3/455

R180 DEG=8 F=IA AUT=2 P=(1,2222,2222,1) GIR=3 CN=5,5
A=1 1 3 15,37 37 105 43 472,334 2300 1440 14604 34602,55412 36224 377000
E=-4 2-2.75877 10-1 2+1.69459 2+4.06418 8 K=(13 4,15 8) SW(13) -D(R111)
-D(R158) 1/650 4/10665

R181 DEG=8 F=I AUT=24 P=(1,26,234) GIR=3 CN=3,6
A=1 3 5 5,13 23 5 203 770,770 606 56 126 35540,75230 36540 236230
E=3-4 8-1 6+2 8 K=(18 10 5 1,10) 2/464 3/1160 5/1167

R182 DEG=8 AUT=1 P=(1/8/9) GIR=3 CN=6,5
A=1 3 7 15,31 15 105 61 660,1016 1304 3642 12012 24560,64702 166422 37340
E=-4 2-2.73205 4-1.79129 4-1 2+.73205 4+2.79129 8 K=(15,13 6) 3/523

R183 DEG=8 AUT=2 P=(1,11222,111222) GIR=3 CN=3,6
A=1 1 5 5,21 11 105 45 170,1602 1144 5622 5612 26532,16272 22566 12356
E=2-4.64575 2-3 2-1 5+0 2+.64575 4+2 8 K=(20 14 5 1,8) D(R117) 3/1423 5/5425

R184 DEG=8 AUT=1 P=(1/8/9) GIR=3 CN=4,6
A=1 1 1 5,15 15 1 205 760,732 3216 4462 7440 31036,30356 40762 230332
E=2-5.08832 2-2.28142 2-.67948 2-.67045 3+0 2+.97601 2+1.74366 2+2 8
K=(21 18 5,7) D(R134) 4/6164

R185 DEG=8 F=IA AUT=2 P=(1,2222,2222,1) GIR=3 CN=4,6
A=1 3 5 13,25 13 5 3 572,374 664 712 10704 24642,51520 126250 377000
E=2-4.75877 8-1 2-.30541 0 2+2.06418 2+3 8 K=(18 16 5,10) SW(15) -D(R190)
-D(R35) 1/146 4/6303

R186 DEG=8 F=IA AUT=8 P=(1,44,44,1) GIR=3 CN=5,5
A=1 3 3 15,25 53 31 207 612,170 1624 2146 11502 34444,23310 146260 377000
E=4-3 8-1 0 4+3 8 K=(14 4,14 4) SW(14) -D(R186) -D(R39) 2/74 3/1503 5/3252

R187 DEG=8 AUT=1 P=(1/8/9) GIR=3 CN=5,5
A=1 1 1 15,1 51 111 145 470,1126 416 4162 6264 35306,7662 11256 232612
E=-4 2-3.8490 2-2.7321 2-.9383 2+.0902 2+.7321 2+.8480 2+1.6329 2+2.2161 8
K=(19 8,9 2) D(R133) D(R58) 4/10273

TRANSITIVE GRAPHS ON 18 VERTICES (CONTD)

R188 DEG=8 F=I AUT=512 P=(1,44,144) GIR=3 CN=3,6
A=1 1 1 1,7 71 107 271 776,530 246 530 246 36030,76006 76006 336030
E=2-4 2-3.06418 2-.69459 9+0 2+3.75877 8 K=(16 12 5 1,12) D(R28) I6[B1] 1/606
4/3360

R189 DEG=8 F=I AUT=12 P=(1,26,36) GIR=3 CN=5,6
A=1 3 5 13,5 43 5 203 36,606 146 5660 13550 36330,3360 105710 306470
E=-4 6-2.73205 6+.73205 4+2 8 K=(18 4,10) 3/136 5/10356

R190 DEG=8 F=IA AUT=2 P=(1,2222,2222,1) GIR=3 CN=6,4
A=1 1 3 5,13 65 173 375 524,252 2052 1124 6012 31024,75004 176002 377000
E=2-3 2-2.06418 8-1 0 2+.30541 2+4.75877 8 K=(10,18 16 5) SW(16) -D(R185)
-D(R25) -D(R36) -D(R42) -D(R50) 1/36 4/12446

TRANSITIVE GRAPHS ON 19 VERTICES

S1 DEG=0 F=XTVIAP P=(1,+) CN=1,19

S2 DEG=2 F=TVIP AUT=2 P=(1,2,2,2,2,2,2,2,2) GIR=19 CN=3,10 POLYGON
A=1 1 4 2,20 10 100 40 400,200 2000 1000 10000 4000,40000 20000 200000 500000
E=2-1.973 2-1.759 2-1.355 2-.803 2-.165 2+.491 2+1.094 2+1.578 2+1.892 2
K=(105 364 715 792 462 120 9,) 1/2

S3 DEG=4 F=VI AUT=2 P=(1,22,22,22,22,2) GIR=3 CN=4,7
A=1 1 3 15,24 12 44 102 500,240 1400 2200 12000 5000,44000 30000 320000 740000
E=2-2.158 2-2.138 2-1.520 2-1.268 2-.665 2-.081 2+.291 2+2.069 2+3.470 4
K=(66 120 70 6,3) D(S2) 1/401

S4 DEG=4 F=VI AUT=2 P=(1,22,2222,222) GIR=4 CN=3,10
A=1 1 1 1,24 12 2 4 420,210 422 4214 2100 21040,42000 21000 300300 300440
E=2-3.114 2-2.776 2-1.482 2-.312 2+.133 2+.537 2+.929 2+1.413 2+2.672 4
K=(69 152 155 66 7,) 1/22

S5 DEG=4 F=VI AUT=2 P=(1,22,2222,222) GIR=4 CN=3,10
A=1 1 1 1,10 60 24 12 2,4 114 62 13000 7000,20440 40300 201400 502200
E=2-3.327 2-2.562 2-.969 2-.394 2-.261 2-.181 2+1.585 2+1.726 2+2.383 4
K=(69 152 160 78 14,) 1/402

S6 DEG=4 F=VI AUT=2 P=(1,22,222,222,2) GIR=4 CN=3,10
A=1 1 1 1,34 32 4 2 14,22 2400 1200 10400 24200,2500 1240 250000 524000
E=2-3.7317 2-1.9241 2-.8788 2-.8636 2+.2237 2+.3258 2+.7749 2+1.0882 2+2.9855 4
K=(69 156 185 126 49 8,) 1/30

S7 DEG=6 F=VI AUT=2 P=(1,222,222,222) GIR=3 CN=5,5
A=1 1 3 5,33 75 124 52 412,224 2204 1402 10000 24000,71400 66200 171000 666000
E=2-2.623 2-1.840 2-1.682 2-1.647 2-.830 2-.266 2+.059 2+1.266 2+4.564 6
K=(36 20,9 4) 1/601

S8 DEG=6 F=VI AUT=2 P=(1,222,22222,2) GIR=3 CN=4,7
A=1 1 5 3,25 13 102 44 550,1360 22 14 11410 6220,14404 114202 270200 564400
E=2-2.727 2-2.233 2-2.153 2-1.749 2-.984 2+.230 2+.923 2+2.217 2+3.477 6
K=(39 36 5,6) 1/242

S9 DEG=6 F=VI AUT=2 P=(1,222,2222,22) GIR=3 CN=4,7
A=1 1 1 11,23 55 134 72 214,422 2 4 6042 11104,55200 36400 256000 535000
E=2-3.492 2-2.323 2-1.468 2-1.064 2-.246 2-.174 2+.310 2+1.497 2+3.961 6
K=(39 40 15,6) D(S3) 1/520

TRANSITIVE GRAPHS ON 19 VERTICES (CONTD)

S10 DEG=6 F=VI AUT=2 P=(1,222,22222,2) GIR=3 CN=4,7
A=1 1 1 1,21 51 134 72 4,1002 42 104 12014 25022,12254 5522 57400 37200
E=2-3.9169 2-2.9413 2-1.4357 2-.4258 2+.0965 2+.6237 2+.7815 2+.9132 2+3.3048 6
K=(42 56 30 6,3) 1/124

S11 DEG=6 F=VI AUT=2 P=(1,222,222222) GIR=4 CN=4,10
A=1 1 1 1,1 1 160 150 104,1042 2134 1072 5602 12604,2214 101422 220054 540122
E=2-4.535 2-2.836 2-1.535 2-.032 2+.610 2+.699 2+1.420 2+1.579 2+1.631 6
K=(45 68 45 12,) 1/510

S12 DEG=6 F=VI AUT=2 P=(1,222,22222,2) GIR=4 CN=3,10
A=1 1 1 1,1 1 174 172 74,132 2004 5002 10044 24102,50054 24122 252400 525200
E=2-5.086 2-1.198 2-.671 2-.478 2-.388 2-.346 2+1.028 2+1.318 2+2.820 6
K=(45 80 75 36 7,) -D(S7) 1/222

S13 DEG=6 F=VI AUT=2 P=(1,222,222222) GIR=3 CN=4,7
A=1 1 3 15,1 1 12 24 344,542 50 120 12110 25060,14304 114442 26604 51602
E=2-3.279 2-3.241 2-1.667 2-1.044 2-.884 2+1.227 2+1.869 2+1.904 2+2.115 6
K=(42 48 10,3) D(S6) 1/441

S14 DEG=6 F=VI AUT=6 P=(1,6,66) GIR=3 CN=5,7 T=1
A=1 1 7 5,21 43 14 102 340,424 60 4012 12402 35040,6420 114210 301700 63204
E=6-2.28514 6-1.22188 6+2.50702 6 K=(39 32,6) 1/301

S15 DEG=6 F=VI AUT=2 P=(1,222,22222,2) GIR=3 CN=4,7
A=1 3 5 3,1 1 130 70 144,142 414 4222 12304 5442,42120 21050 312400 705200
E=2-3.897 2-2.638 2-1.433 2-1.029 2-.580 2+.715 2+1.013 2+2.182 2+2.667 6
K=(42 52 20,3) 1/620

S16 DEG=6 F=VI AUT=2 P=(1,222,22222,2) GIR=3 CN=4,7
A=1 1 1 11,21 11 56 326 40,1100 1064 2112 1224 2412,41102 22044 336000 355000
E=2-4.131 2-2.071 2-2.020 2-.560 2+.125 2+.372 2+.410 2+1.711 2+3.163 6
K=(42 56 30 6,3) 1/203

S17 DEG=8 F=VI AUT=2 P=(1,2222,22222) GIR=3 CN=4,7
A=1 3 5 3,25 13 5 3 100,1040 1472 6334 3664 3712,42704 121642 113270 207530
E=2-4.700 2-2.339 2-1.258 2-1.059 2-.342 2+.065 2+.458 2+2.501 2+2.673 8
K=(24 20 5,9) 1/660

S18 DEG=8 F=VI AUT=2 P=(1,2222,22222) GIR=3 CN=5,7
A=1 1 3 5,15 23 101 241 634,632 2434 1232 14304 34442,41506 122246 252160 525150
E=2-3.992 2-2.552 2-2.319 2-2.237 2+.863 2+.908 2+1.504 2+1.809 2+2.017 8
K=(24 16,9) D(S8) 1/131

S19 DEG=8 F=VI AUT=2 P=(1,2222,22222) GIR=3 CN=4,7
A=1 1 5 13,11 61 101 241 416,226 1220 2410 15724 16652,15162 16154 112506 605246
E=2-4.296 2-2.823 2-1.601 2-1.229 2-.977 2+1.332 2+1.404 2+1.988 2+2.202 8
K=(24 16 5,9) 1/560

S20 DEG=8 F=VI AUT=2 P=(1,2222,22222) GIR=3 CN=5,5
A=1 1 7 17,1 1 25 13 712,664 2250 5520 6346 11546,52110 125060 310342 704544
E=2-4.595 2-2.643 2-1.700 2-.553 2-.104 2+.225 2+1.061 2+1.101 2+3.209 8
K=(24 16,9 4) 1/151

S21 DEG=8 F=VI AUT=2 P=(1,2222,22222) GIR=3 CN=5,6
A=1 1 7 7,25 13 15 23 570,1370 2250 1520 14604 34602,46044 131102 344502 730244
E=2-3.508 2-2.957 2-1.742 2-1.149 2-.836 2-.655 2+1.414 2+2.122 2+3.311 8
K=(21 8,12 4) -D(S4) 1/702

TRANSITIVE GRAPHS ON 19 VERTICES (CONTD)

S22 DEG=8 F=VI AUT=2 P=(1,2222,22222) GIR=3 CN=5,5
A=1 3 7 7,13 65 101 41 334,472 1440 6300 15604 16602,54410 134220 342454 321322
E=2-3.406 2-2.803 2-2.788 2-.746 2-.089 2+.209 2+.550 2+1.312 2+3.760 8
K=(21 8,12 4) 1/47

S23 DEG=8 F=VI AUT=2 P=(1,2222,22222) GIR=3 CN=4,7
A=1 1 3 15,15 63 105 43 572,374 1002 2004 14604 34602,55410 136220 254324 134452
E=2-4.082 2-2.399 2-1.662 2-1.050 2-.573 2+.110 2+.143 2+1.718 2+3.796 8
K=(21 16 5,12) -D(S26) 1/612

S24 DEG=8 F=VI AUT=2 P=(1,2222,22222) GIR=3 CN=5,7
A=1 1 3 15,11 21 15 23 320,450 452 4324 7304 33442,1754 102762 57106 37046
E=2-4.044 2-3.640 2-1.387 2-.394 2-.128 2+.356 2+.534 2+1.704 2+2.998 8
K=(24 16,9) 1/36

S25 DEG=8 F=VI AUT=2 P=(1,2222,22222) GIR=3 CN=5,5
A=1 1 5 3,33 75 41 301 22,1014 1614 2622 7062 13114,5710 112660 165406 272206
E=2-3.441 2-3.001 2-2.005 2-1.044 2-.745 2-.339 2+.828 2+2.591 2+3.157 8
K=(21 4,12 4) 1/621

S26 DEG=8 F=VI AUT=2 P=(1,2222,2222,2) GIR=3 CN=7,4
A=1 1 3 5,13 65 173 375 524,252 2012 1024 15004 36002,46052 31124 375000 776000
E=2-3.037 2-1.914 2-1.634 2-1.529 2-.493 2-.431 2-.262 2+.245 2+5.055 8
K=(15,18 16 5) -D(S9) 1/161

S27 DEG=8 F=VI AUT=2 P=(1,2222,22222) GIR=3 CN=5,5
A=1 1 3 5,21 51 173 175 564,352 24 4012 12202 25404,76084 175002 255064 136112
E=2-3.195 2-2.450 2-2.025 2-1.191 2-.731 2-.707 2+.748 2+1.152 2+4.399 8
K=(18 4,15 8) -D(S5) 1/701

S28 DEG=8 F=VI AUT=2 P=(1,2222,22222) GIR=3 CN=5,5
A=1 3 3 5,11 61 27 17 412,1224 2460 1310 16270 15530,4544 110342 327042 353104
E=2-3.426 2-2.239 2-2.185 2-1.847 2-1.349 2-.069 2+1.950 2+2.360 2+2.805 8
K=(21 8,12 4) 1/123

S29 DEG=8 F=VI AUT=2 P=(1,2222,22222) GIR=3 CN=4,7
A=1 3 5 13,1 1 3 5 734,672 2364 1552 12104 25042,60760 60750 250524 524252
E=2-5.2514 2-2.1468 2-1.8321 2+.1451 2+.4232 2+.5142 2+.6938 2+.8476 2+2.6063 8
K=(27 28 10,6) D(S15) 1/614

S30 DEG=8 F=VI AUT=2 P=(1,2222,22222) GIR=3 CN=4,7
A=1 3 5 3,1 1 1 1 774,772 2124 5052 10724 24652,50524 124252 210764 104752
E=2-5.890 2-1.363 2-.945 2-.441 2-.180 2+.616 2+1.190 2+1.466 2+1.546 8
K=(30 40 25 6,3) D(S10) D(S12) D(S16) 1/74