values for $P = \frac{2}{\sqrt{\pi}} \int_0^\beta e^{-\beta^2} d\beta$: with P ranging in value as indicated: [0(0.0001) 0.9] 9D; [0.9(0.00001)0.99997]9D.

On each sheet the column indicated by P, the argument, is followed immediately on the same line with the 9-decimal-place value for beta. The values following the beta values on the intervening lines, indicated as $\Delta_1 P$, are the differences between successive pairs of beta values. Only the last decimal place is tabulated in the argument except at the 0.0010's values, where all are given. The digits in the values of beta to the right of the decimal point are omitted when they continue downward the same in the tabulation, except at the 0.0010's values, where all are given.

AUTHOR'S SUMMARY

53[L, S].—JOSEPH HILSENRATH & GUY G. ZIEGLER, *Tables of Einstein Functions—Vibrational Contributions to the Thermodynamic Functions*, National Bureau of Standards, Monograph 49, U. S. Government Printing Office, Washington, D. C., 1962, vii + 258 p., 26 cm. Price $2.75.

It is a well-known theorem of statistical mechanics that a harmonic oscillator (or any degree of freedom of a complex molecule quantized in the same way) contributes the following to the (Gibbs) free energy, enthalpy, entropy, and heat capacity:

$$-(F^\circ - E^\circ_0)/RT = -\ln(1 - e^{-x})$$

$$(\mathrm{H}^\circ - E^\circ_0)/RT = xe^{-x}(1 - e^{-x})^{-1}$$

$$S^\circ/R = xe^{-x}(1 - e^{-x})^{-1} - \ln(1 - e^{-x})$$

$$C^\circ{}_p/R = x^2 e^{-x}(1 - e^{-x})^{-2}$$

where $x = hc\nu/kT$. This book contains first a table of the above dimensionless quantities for $x = 0.0010$ (.001) 0.1500 (.001) 4.00 (.01) 10.00 (.2) 16.0. A second table gives $-(F^\circ - E^\circ_0)/T$, S°, and $C^\circ{}_p$ (all in calories/mole-deg) for $T = 273.15°$K, 298.15°K, 400°K and thence by 100° intervals to 5000°K. For each temperature the frequency ν (in cm^{-1}) runs from 100 to 4000 in steps of 10. All results are stated to 5 decimal places, and the accuracy is claimed to be better than one-half a unit in the last place.

These tables would be far more useful if harmonic oscillators were more common components of molecules and crystals. Unfortunately, most vibratory degrees of freedom are not very harmonic, and accurate computations of thermodynamic properties require corrections for anharmonicity. These corrections cannot easily be applied to the final thermodynamic functions, but rather tend to require a complete new calculation.

In this reviewer's opinion the need for tables like these is passing. With computers now very generally available, the essential content of these tables could have been stored much more conveniently in the form of a set of subroutines in standard machine languages like FORTRAN. This would make the results available where they are most needed: as inputs to machine calculations for specific molecules and crystals.

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EDITOR'S NOTE: The author has notified us that he has recomputed the tables over certain ranges of the variable in multiple precision and has found numerous last-place errors on pages 3 and 4 of $x = .0010$ to $.0100$. An Errata sheet has been prepared and is available on request.

54[M].—L. S. PONTRYAGIN, *Ordinary Differential Equations*, Addison-Wesley Publishing Company, Inc., Reading, Massachusetts, 1962, vi + 298 p., 23 cm. Price \$7.50.

From the publisher's preface: "This book constitutes a mildly radical departure from the usual one-semester first course in differential equations."

From the author's preface: "The most important and interesting applications of ordinary differential equations to engineering are found in the theory of oscillations and in the theory of automatic control. These applications were chosen to serve as guides in the selection of material."

One could attempt to characterize Pontryagin's "mildly radical departure" as a combination of more modern theory and more realistic application. There is a long chapter on stability theory, Lyapunov's theorem, limit cycles, and periodic solutions. While an earlier and even longer chapter has a title that is "classical" enough, namely, "Linear Equations with Constant Coefficients," the strong geometric emphasis, and the many diagrams of phase trajectories, nodes, saddle points, etc., are again distinctly modern in character.

It seems likely that the book will not only be successful in itself, but will also markedly influence the content of future textbooks. Although American authors are unlikely to put quite as much stress on Vyshnegradskiy's theory of the centrifugal governor and Andronov's analysis of the vacuum-tube oscillator, the approach used here will probably be widely followed.

Educational prognostications aside, the book can be recommended to those who learned differential equations the "old way" and who wish an introduction to newer technique and content. The book is interesting, and individual in style. Who but Pontryagin would combine "The breakdown in performance of governors in the middle of the 19th century is explained by the fact that, due to the development of engineering, all four quantities appearing in (15) were subjected to changes which served to diminish the stability" (page 220) with "Such cases can be easily imagined; for example, N can be the perfect set of Cantor" (page 233)?

There is a supplementary chapter on relevant matrix theory. There are no exercises.

D. S.

55[M, X].—ATHANASIOS PAPOULIS, *The Fourier Integral and its Applications*, McGraw-Hill Book Company, Inc., New York, 1962, ix + 318 p., 23 cm. Price \$10.75.

This book treats what has long been known as operational calculus from the point of view of the Fourier integral theorem and the Fourier transform rather than from the point of view of the Laplace transform. The book consists of three parts and two appendices. In the first part, in addition to the Fourier integral theorem, the convolution theorem, Parseval's formula etc., an elementary dis-