The editorial committee would welcome readers' comments about this microfiche feature. Please send comments to Professor Eugene Isaacson, MATHEMATICS OF COMPUTATION, Courant Institute of Mathematical Sciences, New York University, 251 Mercer Street, New York, New York 10012.

Mathematics of Computation

TABLE OF CONTENTS

APRIL 1970

TABLES OF

GAUSSIAN QUADRATURE RULES

FOR THE CALCULATION OF FOURIER COEFFICIENTS

By

WALTER GAUTSCHI

Writing Fourier coefficients in the form

$$\frac{1}{2\pi}\int_{-\pi}^{\pi} f(x)\genfrac{}{}{0pt}{}{\cos}{\sin}(mx)\,dx = \int_{-1}^{1} f(\pi x)\genfrac{}{}{0pt}{}{c_m}{s_m}(x)\,dx - \int_{-1}^{1} f(\pi x)s_0(x)\,dx,$$

where

$$c_m(x) = \tfrac{1}{2}(1+\cos m\pi x)\ ,\ s_m(x) = \tfrac{1}{2}(1+\sin m\pi x),\ m = 0,1,2,\ldots,$$

are (nonnegative) weight functions, the integrals on the right may be approximated by appropriately weighted Gaussian quadrature rules,

$$\int_{-1}^{1} f(\pi x)\genfrac{}{}{0pt}{}{c_m}{s_m}(x)\,dx \doteq \sum_{r=1}^{n} \lambda_r^{(n)} f(\pi\xi_r^{(n)}).$$

Table 3 (pp. T1-T24) relates to the weight function $c_m(x)$, and gives 12D values of $\xi_r^{(n)}$, $\pi\xi_r^{(n)}$, $\lambda_r^{(n)}$ for $n = 1(1)8,16,32$ and $m = 1(1)12$. Only the nonnegative abscissas and corresponding weights are listed, the others being obtainable from the symmetry relations $\xi_{n+1-r}^{(n)} = -\xi_r^{(n)}$, $\lambda_{n+1-r}^{(n)} = \lambda_r^{(n)}$, $r = 1,2,\ldots,n$.

Table 4 (pp. T25-T50) relates to the weight function $s_m(x)$, and contains 12D values of $\xi_r^{(n)}$, $\pi\xi_r^{(n)}$, $\lambda_r^{(n)}$ for $n = 1(1)8,16,32$ and $m = 0(1)12$.

The tables were computed in single precision floating point arithmetic on the CDC 6500 computer, using the methods described in the article "On the construction of Gaussian quadrature rules from modified moments" by the same author. (Cf., in particular, section 5(ii).)