

MAD 4401 SPRING 2020 QUIZ 2 JAMES KEESLING

These problems are to help you become familiar with the principles of numerical integration and the programs in the document **Numerical-Methods.tns**. The problems will not be collected or graded.

Problem 1. Determine the normalized coefficients for Newton-Cotes integration for n points, $n = 2, 3, 4, 5, 6, 7, 8, 9, 10$

Problem 2. Determine the Newton-Cotes estimate of the integral

$$\int_{-2}^3 \sin(x^2) dx$$

using ten points.

Problem 3. Use Romberg Integration to estimate the integral

$$\int_1^3 \exp(x^2) dx.$$

Do this using 2^8 intervals. From the matrix output determine many digits are likely correct?

Problem 4. Suppose that we want to estimate the integral of $f(x)$ on the interval $[0, 5]$ using the points $\{0, \frac{3}{2}, 5\}$. What should the coefficients $\{A_0, A_1, A_2\}$ be?

$$\int_0^5 f(x) dx \approx A_0 \cdot f(0) + A_1 \cdot f\left(\frac{3}{2}\right) + A_2 \cdot f(5)$$