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?

\[
\int_{0}^{5} f(x) \, dx \approx A_0 \cdot f(0) + A_1 \cdot f\left(\frac{3}{2}\right) + A_2 \cdot f(5)
\]