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Math128A: Numerical Analysis Programming Assignment #2, Due April 9, 2008

Let α and ω be constants. Our job is to compute

$$I(\alpha,\omega) = \int_0^1 |\sin(\omega\pi x)|^\alpha dx,$$

for each of the values $\omega = 1, 10, 100$ and $\alpha = 0.5, 1, 2$. Compute this integral using

- Composite Simpson's rule for N = 20.
- Gaussian Quadrature, using nodes and coefficients on Table 4.11, and formula (4.42).

Furthermore, for $\alpha = 0.5$ and $\omega = 2$,

- Re-arrange the integral to make it a proper integral. Note that the fact that the integrant is continuous does not make the integral proper. All of our quadratures require some smoonthness in derivatives.
- Re-compute the integral using the same Composite Simpson's rule and the Gaussian Quadrature.

Compare your results with those obtained from the quad function in matlab.