Let $\alpha$ and $\omega$ 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 integrand is continuous does not make the integral proper. All of our quadratures require some smoothness 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.