## Math 1552, Integral Calculus Section 8.7: Numerical Integration

Let  $\theta$  be an angle in radians,  $-\frac{\pi}{2} < \theta < \frac{\pi}{2}$ , so that  $\tan \theta = \frac{1}{2}$ . We can find the value of  $\theta$  using the integral:

$$\theta = \tan^{-1}\left(\frac{1}{2}\right) = \int_0^{1/2} \frac{1}{1+x^2} dx.$$

**1.** Estimate the value of  $\theta$  with the trapezoidal rule using n = 4 subintervals.

**2.** The actual value is approximately 0.46365. What is the percent error in your estimate in problem 1?

**3.** Estimate the value of  $\theta$  with Simpson's rule using n = 2 subintervals. Find the percent error in your estimate.