## 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:

$$
\theta=\tan ^{-1}\left(\frac{1}{2}\right)=\int_{0}^{1 / 2} \frac{1}{1+x^{2}} d x
$$

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.
