

Math 250a (Fall '07) - Homework 10 extra problems

1. This problem is about the definite integral

$$\int_0^1 \sin^2(\pi x) dx$$

- (a) Show the exact value of this integral is $1/2$.
- (b) Use the program to compute the trapezoid approximation for $N = 10, 20$ and 40 . Find the error in each of the three cases.
- (c) Use extrapolation with $N = 10, 20$ to find a better approximation and compute its error. Now use extrapolation with $N = 20, 40$ and find its error. What do you think is the order of the extrapolation method using the trapezoid rule?

2. The left, right and trapezoid rules for approximating a definite integral all have the form

$$Af(x_0) + \sum_{i=1}^{n-1} f(x_i) + Bf(x_n)$$

where the constants A and B depend on the method. For the left rule, $A = 1, B = 0$. For the right rule, $A = 0, B = 1$. What are A and B for the trapezoid rule?