Numerical Methods I – Lab 6

Fall Semester 2005

November 15, 2005

1. Write an Octave function to integrate a function f on the interval $[a, b]$ by using the composite trapezoidal rule with N equispaced partitions.

   The trapezoidal rule on partition i reads

   $$\int_{x_{i-1}}^{x_i} f(x)\,\mathrm{d}x \approx h\,\frac{f(x_{i-1}) + f(x_i)}{2}\,,$$

   where $h = (b - a)/N$.

2. Test, by generating a doubly logarithmic error plot, whether the trapezoidal rule is really of order 2 for each of the functions

   $$f(x) = \mathrm{e}^x\,,$$
   $$g(x) = \sin 2\pi x\,,$$
   $$h(x) = x^{1/3}$$

   on the interval $[0, 1]$.