Math 128a, Chorin, Spring 2013, computer homework 3

1. Evaluate the integral $\int_0^1 f(x)dx$ for $f(x) = e^{-x^2}/(1 + \tanh^2(x))$, (i) by the trapezoidal rule, and (ii) by extrapolation from two trapezoidal rule integrations. Use the extrapolated value to check the order of accuracy of the trapezoidal rule (i.e., the power n of h in an error estimate $O(h^n)$). Figure out what mesh size h you have to use so that the trapezoidal rule without extrapolation has an error $< 10^{-5}$.

2. Evaluate the same integral by Gaussian quadrature with 5 integration points (if you are getting the Gaussian nodes and weights from some piece of software, be careful about the intervals, you may need to change variables).