Third Computing Project
Math/CS 375, Fall 1997
Professor Coutsias

This project is due October 28. Plan your work so that if your computer is down a short period, your project will not be late.

This project will count as part of your grade so you must work independently. It is permissible to discuss the project with your instructor, fellow students, and friends. However, the computer programs and report must be done only by the student doing the project.

The project is to compare various polynomial and piecewise polynomial interpolants. In particular, you are to compare polynomial interpolants computed using 9 and 17 equally spaced and Chebyshev nodes and a cubic spline interpolant using 9 and 17 equally spaced nodes. The functions to be approximated are:

(i.) $\cos(\pi x) \cdot e^{-x}, \quad 0 \le x \le 4.$

(ii.) $\frac{1}{1+x^2}, \quad -5 \le x \le 5.$

(iii.) $\sqrt{x}, \quad 0 \le x \le 2.$

For all 18 approximations plot the approximation with the true function and also plot the error. Comment on which functions were most easily approximated and which methods of approximation worked best. Give some theoretical explanation for the observed results. (Precise error estimates are unnecessary.) For the polynomial interpolation, you may either use an exisitng routine (for example, Matlab's interp) or write your own divided difference algorithm and evaluation routine using nested multiplication. For the splines you are to use the book's routines Spcoeff, Svalue.

Grading guidelines: Correct use of the interpolation functions or correct programs if you write them 50%; Completion of the examples 35%, Discussion 15%.