COLBY COLLEGE
Department of Mathematics
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**Fall 1998**

## Assignment 12: Numerical Differentiation

Reading: Faires and Burden Section 3.2 and 4.9.
Due: Thursday 10 December
The purpose of this assignment is to give you a little practice with numerical differentiation and Lagrange polynomials.

### Lagrange polynomials

Let's say you were trying to find the minimum point of a function of one variable, $f(x)$. One of the things you might try is to evaluate the function at three points, find the parabola that goes through those three points, and then find the critical point of that parabola.

1. Using a Lagrange polynomial to fit the points, find the location of the critical point in terms of the values $x_0$, $x_1$, $x_2$ and $f_0 = f(x_0)$, $f_1 = f(x_1)$, $f_2 = f(x_2)$.
2. Given the critical point, how would to check to make sure you had found the minimum in the range? What would you do if the critical point turned out to be a maximum instead of a minimum?

### Differentiation

1. Do Exercise 4.9.16, using the most accurate formula available for each value.