1. Write out the first and second divided differences explicitly and give their geometric meaning in terms of secant slopes.

2. Observe numerically the divergence of interpolation at equally spaced points on $[-5, 5]$ for $f(x) = \frac{1}{1+x^2}$ as $n \to \infty$ for $|x| > 3.63$ |x| > 3.63. How do its coefficients in the estimate grow? Explain the observed behavior of interpolating coefficients.

3. Determine (analytically) the spacing h in a table of evenly spaced values of the function $f(x) = \sqrt{x}$ between 1 and 2, so that interpolation with
   a) 1^{st} degree polynomial
   b) 2^{nd} degree polynomial
   in this table will yield a desired accuracy of at least N places after zero. Choose your own N.

4. Develop a program that magnifies (monochrome) image by a factor of 2^N using bilinear interpolation. Implement this up-scaling in 2 different ways: 1) directly, i.e. calling interp2 once; and 2) N times iteratively doubling the size. Compare the outputs and discuss the variation in the output (if any).