CS 323E # Homework 1 **Due: Sept. 14, 2004**

1. Read Sections 1.1 and 1.2 from the textbook (nothing needs to be turned in).

2. (2 points) Run the MATLAB script file **ExpPlot** given on page 16. Turn in **only** the plots for $n = 10$ and $n = 200$.

3. (3 points) Do problem P1.2.9 from the textbook.

4. (7 points) A formula to approximate π is

$$\begin{aligned} P_{n+1} &= 2^n \sqrt{2\left\{1 - \sqrt{1 - \left(\frac{P_n}{2^n}\right)^2}\right\}}, \quad \text{for } n = 2, 3, \ldots \\ P_2 &= 2\sqrt{2}. \end{aligned}$$

   What is the approximation P_{n+1} for $n = 39$? Is it accurate? Derive and write down an improved approximation and give its value for $n = 39$ (give all 16 digits by using "format long" in MATLAB).

5. (8 points) The classic quadratic formula says that the two roots of the quadratic equation

$$ax^2 + bx + c = 0$$

   are

$$x_1, x_2 = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}. \qquad (1)$$

   Use this formula in MATLAB to compute both roots where

$$a = 1, \quad b = -100000000, \quad c = 1.$$

   Compare your computed results with `roots([a b c])`. Are the results different? Can you use a better formula than (1) for computing one or both the roots?