1. Consider the sequence $\{x_n\}$,
$$x_1 = 2, \ x_2 = 3,$$
$$x_{n+1} = x_n - \frac{x_n^2 - 2}{x_n + x_{n-1}}, \ n \geq 2.$$

   a. Estimate numerically the convergence rate of this sequence to $\sqrt{2}$ (i.e. if the convergence is linear, superlinear, quadratic, etc. . .)
   b. How would you estimate the convergence rate if the true value of the limit was not known?

2. Numerically verify the following assertions,
   a. $1/(n \ln n) = o(1/n)$
   b. $1/n = o(1/\ln n)$
   c. $(2n - 1)/n^3 = \mathcal{O}(1/n^2)$

3. Reproduce the example given in class that shows that a relative error less than machine epsilon is not guaranteed for several arithmetic operations (keep in mind Matlab uses double precision).