

# Math 128A, Fall 2016.

## Homework 5, due Oct 5th.

**Prob 1.** Let  $g(x) = x^2 - 2x + 2$ . For what values of  $x_0$  does the iteration  $x_{n+1} := g(x_n)$  converge? What is the order of convergence?

**Prob 2.** For the function  $g$  from Prob. 1, write a MATLAB routine that inputs  $x_0$  and the number of iterations  $n$ , and draws a graph analogous to Figures 2a and 2b on p. 89 in our textbook.

**Prob 3.** For  $g(x) = \cos x$ , prove that the iteration  $x_{n+1} := g(x_n)$  defines a convergent sequence for an arbitrary initial value  $x_0$ .

**Prob 4.** Write a MATLAB routine that calculates the root  $\alpha = \cos \alpha$  to three decimal places.

**Prob 5.** Prove rigorously that your answer to Prob. 4 is correct to three decimal places.