

## Homework#2, Due Date: Thursday March 10, 2016 by Midnight

**Q1.** Use the bisection method to approximate  $\sqrt{3}$  to 4 decimal places. Use  $f(x) = x^2 - 3$  with  $f(0) = -3$  and  $f(2) = 1$  as the starting points.

**Q2.** Show that each of the following iterations have fixed points  $x = \pm\sqrt{3}$

- a)  $p_{i+1} = \frac{3}{p_i}$
- b)  $p_{i+1} = p_i + p_i^2 - 3$
- c)  $p_{i+1} = p_i + 0.25(p_i^2 - 3)$
- d)  $p_{i+1} = p_i - 0.5(p_i^2 - 3)$
- e)  $p_{i+1} = \frac{2p_i - 3}{2 - p_i}$

Determine which of these iterations converge to  $+\sqrt{3}$  and which to  $-\sqrt{3}$ . Compute  $g'$  at the fixed points and relate these values to the convergence properties of the iteration.

**Q3.** Sketch the cubic polynomial

$$p(x) = 4x^3 - 10x^2 + 2x + 5$$

to get a rough estimate of its roots. Use the Newton Raphson method to approximate each root to 6 decimal places.