

This quiz is for practice only, not graded.

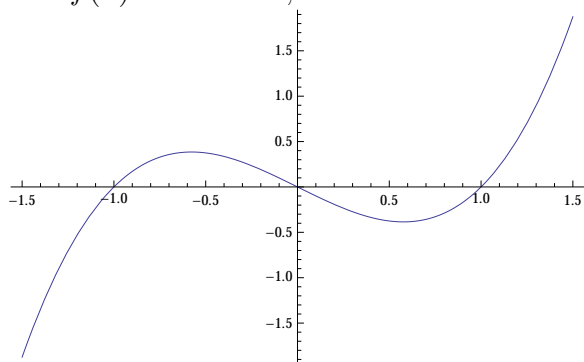
Name: _____

Math 320 – Take Home Quiz 2

This quiz should take you approximately 25 minutes. You may use your calculator, your book, and your notes, but do not work together and do not get help. You are allowed to use Matlab/Octave, but it is not recommended.

- (10) 1. Show 10^{-n^2} converges linearly to 0.
- (10) 2. Give an example of a non-constant polynomial $g(x)$ so that iterating $x_0 = 1.7, x_1 = g(x_0), x_2 = g(x_1), \dots$ converges to $\sqrt[3]{5}$.
- (10) 3. The function $f(x) = x^2 - x - 1$ has roots $\varphi = \frac{1+\sqrt{5}}{2}$ and $\bar{\varphi} = \frac{1-\sqrt{5}}{2}$. The larger root $\varphi \approx 1.618$ is known as the *golden mean*. Use Newton's method with $x_0 = 2$ to compute x_1 and x_2 . However, do not use decimal approximations – carry out your computations exactly so that you get fractions which are good approximations to φ .

(10) 4. Let $f(x) = x^3 - x$, as shown below. Apply Newton's method to solve $f(x) = 0$.



- (a) Begin with initial guess $x_0 = 0.3$. Which root does Newton's method converge to?
- (b) Begin with initial guess $x_0 = 0.8$. Which root does Newton's method converge to?
- (c) Begin with initial guess $x_0 = 0.5$. Which root does Newton's method converge to?
- (d) Begin with initial guess $x_0 = 0.455$. Which root does Newton's method converge to?

(10) 5. Behold a function $f(x)$ graphed below, along with the line $y = x$. Draw an accurate cobweb plot starting at $x_0 = 0.2$, to see what will happen if you iterate this function.

