

Math 174 Midterm

October 30, 2013

- Please put your name, ID number, and sign and date.
- There are 4 problems worth a total of 100 points.
- Calculators are allowed but **you must show your work to receive credit.**

Print Name: _____

Student ID: _____

Signature and Date: _____

Problem	Score
1	/25
2	/25
3	/25
4	/25
Total	/100

1. (25 pts) Suppose we are given the following Matlab function in the file f.m:

```
function [y] = f(x)
    y = cos(x)-x;
end
```

Now given the header for a Matlab function:

```
function [pn] = secantmethod(p0,p1,n)
```

complete the function so that the function returns secant method's approximation p_n of the root of f for initial guesses $p_0 = p0, p_1 = p1$.

2. (25 pts) Let $f(x) = x^2 - \frac{2}{x}$.

(a) Using starting interval $[1, 2]$, if the first approximation is called c_0 , find the **method of false position**'s approximations c_1 and c_2 of the root of f .

(b) Using $p_0 = 2$, find **Newton's method**'s approximations p_1 and p_2 of the root of f .

3. (25 pts) Let f be continuous in $[-1, 3]$ and suppose $f(-1), f(3)$ have opposite signs. Applying the bisection method for the root of f with starting interval $[-1, 3]$, call the first approximation $c_0 = (-1+3)/2$. Using bounds, **estimate** n such that the absolute error of the approximation c_n will be $\leq 10^{-9}$. You do not have to simplify your result.

4. (25 pts) Let g be a continuous function in $[1, 4]$ and suppose $2 \leq g(x) \leq 3$ for all $x \in [1, 4]$. Show g **has a fixed point** in $[1, 4]$.