

Assignment: Homework. 2 Name: Tanner Orndorff

Disclaimer: This is my work, not that of others:

Total Score: 100

Problem 1 score: 20

Problem 2 score: 20

Problem 3 score: 20

Problem 4 score: 20

Problem 5 score: 20

# Section 1.1

~~[0,1]~~?

[2,3]

(5)  $x^4 = x^3 + 10$  or  $x^4 - x^3 - 10 = 0$

a) [a,b]

$0^4 - 0^3 - 10 = -10 = 0$

~~$1^4 - 1^3 - 10 = -10 = 0$~~

$1^4 - 1^3 - 10 = -10 = 0$

~~$0 = -x^4 + x^3 + 10$~~

(12)

~~$0 = 0^4 + 0^3 + 10$~~

~~[1,2]~~?

~~$0 =$~~

$16 - 8 - 10 = 0$

[2,3]

[2,3]?

$81 - 27 - 10 = 0$

b)  $\frac{(b-a)}{2^{n+1}} < 10^{-10}$

$\frac{3-2}{2^{n+1}} < 10^{-10}$  or  $\frac{1}{2^{n+1}} < 10^{-10}$   
 $10^{-10} = \frac{1}{10000000000}$

$n > \frac{10}{\log_{10} 2} \approx \frac{10}{.301} \approx 33$

33 iterations

# Section 1.2

~~$S = |g'(r)| < 1$~~   $g(r) = r$

(1)

a)  $\frac{3}{x}$   ~~$\frac{3}{x^2}$~~   ~~$3x^{-1}$~~   ~~$-3x^{-2}$~~  or  ~~$\frac{-3}{x^2} = 0$~~

~~$x = \frac{3}{x} = 0$~~

~~$-3x^{-2} = 0$~~

$\frac{3}{x} = x$

$3 = x^2$

$\pm\sqrt{3} = x$

$[-\sqrt{3}, \sqrt{3}]$



$$b) \quad x^2 - 2x + 2 = x$$

$$x^2 - 3x + 2 = 0$$
~~$$x^2 - 3x + 2 = 0$$~~

$$(x-2)(x-1) = 0$$

$$\boxed{1, 2}$$

$$c) \quad x^2 - 4x + 2 = x$$

$$x^2 - 5x + 2 = 0 \quad r = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$r = \frac{5 \pm \sqrt{25 - 4(1)(2)}}{2}$$

$$\boxed{\frac{5 \pm \sqrt{17}}{2}}$$

Exercise 7  $\delta = |g'(r)| < 1$

$$a) \quad g(x) = (2x-1)^{1/3} \quad r=1 \quad \frac{(2x-1)^{-2/3}}{3} \quad \text{or} \quad \frac{1}{3(2x-1)^{2/3}}$$

$$\frac{1}{3(1)^{2/3}} \quad \text{or} \quad \boxed{\frac{1}{3} < 1}$$

convergent.

$$b) \quad g(x) = \frac{(x^3+1)}{2} \quad \text{or} \quad \frac{1}{2}x^3 + \frac{1}{2}$$

$$g'(x) = \frac{3}{2}x^2$$

$$g'(1) = \frac{3}{2}(1) \quad \text{or} \quad \boxed{\frac{3}{2} > 1}$$

Divergent

$$c) \quad g(x) = \sin x + x$$

$$g'(x) = \cos x + 1$$

$$g'(0) = \cos(0) + 1$$

$$g'(0) = 1+1 \quad \boxed{2 > 1} \quad \text{Divergent}$$

## Computer Problems

### 1.1 # 2 a,b,c

```
function xc=bisect(f,a,b,tol)
if sign(f(a))*sign(f(b)) >= 0
    error('f(a)f(b)<0 not satisfied!')
end
fa=f(a);
fb=f(b);
while (b-a)/2>tol
    c=(a+b)/2;
    fc=f(c);
    if fc == 0
        break
    end
    if sign(fc)*sign(fa)<0
        b=c;fb=fc;
    else
        a=c;fa=fc;
    end
end
xc = (a+b)/2;
```

```
clc
f=@(x) x^5+x-1;

xc = round(bisect(f,0,1,.0000000005),8)

f=@(x) (6*x) + 5 - sin(x);

xc = round(bisect(f,-1,0,.0000000005),8)

f=@(x) log(x) + x^2 - 3;

xc = round(bisect(f,1,2,.0000000005),8)
```

### 1.2 # 1 a,b,c

```
function xc=fpi(g, x0, k)
x(1) = x0;
for i=1:k
    x(i+1)=g(x(i));
end
xc=x(k+1);

g=@(x) ((2*x) + 2)^(1/3) ;

xc = round(fpi(g,1/2,20),8)

g=@(x) log(7-x) ;
```

```
xc = round(fpi(g,1/2,20),8)
```

```
g=@(x) log(4-sin(x)) ;
```

```
xc = round(fpi(g,1/2,20),8)
```

Computer problems output, 1.1 2 and 1.2 1

## Command Window

```
xc =
```

```
-0.970898920000000
```

```
xc =
```

```
1.592142940000000
```

```
xc =
```

```
1.769292350000000
```

```
xc =
```

```
1.672821700000000
```

```
xc =
```

```
1.129980500000000
```

```
 >>
```