Assignment: Module 7 Name: Hoyoung kim
Disclaimer: This is my work, not that of others
Total Score: 50

1. 10
2. 10
3. 10
4. 20

1. (10 pts) Problem 7.2

$f(x) = -x^2+8x-12$

a. Determine the maximum and the corresponding value of x for this function analytically, that is, using differentiation

$-2x+8 = 0$ is $f'(x)$ so x is 4

b. verify that yields the same result based on initial guesses of x1 = 0 x2 = 2 x3 = 6

x4 = 2 – (1/2) (((2-0)^2)(f(2)-f(6))-(2-6)^2(f(2)-f(0)))/(((2-0))(f(2)-f(6)-(2-6)(f(2)-f(0))))

4. * 0. - 16. * 12 /. 0 4. * 12

2-(1/2) -192. /. 48. = 4

2. (10 pts) Problem 7.5 – Do it by hand for two iterations (not three).

Solve for the value of x that maximizes f(x) in using the golden-section search, xl =0, xu = 2

$f(x) = -1.5x^6-2x^4+12x$

r is 0.61803 per golden ratio so r(x2-x1)= r2 which is 1.23606

f(xl) = 0 and f(xu) = -104

iter1. f(Xl + r2) = -4.8144139 f(xu-r2) = -8.18793 so we keep f(xl+r2)

xl = 0 xu = 1.23606 x1 = 0.76394

iter2. X2 = 0 + (1.23606 - 0.76394) = 0.47212 f(x1) = -8.1879337847

f(x2) = -5.5494622147 and since f(x2) > f(x1) the max x is0.76394

3. (10 pts) Problem 7.6 – Do it by hand for two iterations (not three). X1=0 x2=1 x3=2

$f(x) = -1.5x^6-2x^4+12x$

itter 1

x4=

1 – (1/2) ((1-0)^2 * (f(1)-f(2)) - (1-2)^2 (f(1)-f(0))) / ((1-0) * (f(1)-f(2)) - (1-2) (f(1)-f(0))))

1 * -8.5-104)-(1 * -8.5-0. / 1 * -8.5-104)-(-1 * -8.5-0

1 - ½ *. -104/ -121 = 0.570237 = x4

Itter 2

X4 =

1 – (1/2) ((1-0.570237)^2 * (f(1)-f(2)) - (1-2)^2 (f(1)-f(0.570237))) / ((1-0.570237) * (f(1)-f(2)) - (1-2) (f(1)-f(0.570237))))

(0.184687 * -8.5-104)-(1 * -8.5- -6.5799085) / 0.429752 * -8.5-104)-(-1 * -8.5- -6.5799085

1 - ½ *. -18.857196/ -50.267195 = 0.81243

So f(x) = -8.4465221798

4. (20 pts) Implement the Golden Search algorithm for finding a local minimum in a given interval.

When using the algorithm that is listed on the book with changes made, I was able to get
X = 1.4275517728064884
F(x)-1.775725653147415
With 40 iteration and 42 times on the function evaluation