Assignment 2 of CISC 2002

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```
1  function y = Assignment_2_1_f(x)
2      y=816*x^3-3835*x^2+6000*x-3125;
3  end
```

Listing 1: Function

```
1  function y = Assignment_2_1_derivative(x)
2      y=816*3*x^2-3835*2*x+6000;
3  end
```

Listing 2: Derivative

1.1

```
1   clear
2   a=1;
3   b=2;
4   m=(a+b)/2;
5   n=1;
6   fprintf('%2dth, a=%9.8f, b=%9.8f, error<%9.8f, m=%9.8f\n',n,a,b,a-b
        ,m)
7   while (b-a)>10^(-6)
8       if Assignment_2_1_f(m)==0
9           break
10      end
11      if sign(Assignment_2_1_f(m))==sign(Assignment_2_1_f(a))
12          a=m;
13      elseif sign(Assignment_2_1_f(m))==sign(Assignment_2_1_f(b))
14          b=m;
15      end
16      m=(a+b)/2;
17      n=n+1;
18      fprintf('%2dth, a=%9.8f, b=%9.8f, error<%9.8f, m=%9.8f\n',n,a,b
        ,a-b,m)
19  end
```

Listing 3: Bisection

```
1   1th , a=1.00000000, b=2.00000000, error<−1.00000000, m=1.50000000
2   2th , a=1.00000000, b=1.50000000, error<−0.50000000, m=1.25000000
3   3th , a=1.25000000, b=1.50000000, error<−0.25000000, m=1.37500000
4   4th , a=1.37500000, b=1.50000000, error<−0.12500000, m=1.43750000
5   5th , a=1.43750000, b=1.50000000, error<−0.06250000, m=1.46875000
6   6th , a=1.46875000, b=1.50000000, error<−0.03125000, m=1.48437500
7   7th , a=1.46875000, b=1.48437500, error<−0.01562500, m=1.47656250
8   8th , a=1.46875000, b=1.47656250, error<−0.00781250, m=1.47265625
9   9th , a=1.46875000, b=1.47265625, error<−0.00390625, m=1.47070313
10  10th , a=1.46875000, b=1.47070313, error<−0.00195313, m=1.46972656
11  11th , a=1.46972656, b=1.47070313, error<−0.00097656, m=1.47021484
12  12th , a=1.47021484, b=1.47070313, error<−0.00048828, m=1.47045898
13  13th , a=1.47045898, b=1.47070313, error<−0.00024414, m=1.47058105
14  14th , a=1.47058105, b=1.47070313, error<−0.00012207, m=1.47064209
15  15th , a=1.47058105, b=1.47064209, error<−0.00006104, m=1.47061157
16  16th , a=1.47058105, b=1.47061157, error<−0.00003052, m=1.47059631
17  17th , a=1.47058105, b=1.47059631, error<−0.00001526, m=1.47058868
18  18th , a=1.47058105, b=1.47058868, error<−0.00000763, m=1.47058487
19  19th , a=1.47058487, b=1.47058868, error<−0.00000381, m=1.47058678
20  20th , a=1.47058678, b=1.47058868, error<−0.00000191, m=1.47058773
21  21th , a=1.47058773, b=1.47058868, error<−0.00000095, m=1.47058821
```

Listing 4: Bisection Output

1.2

```
1  clear
2  x0=1.6;
3  x1=x0−(Assignment_2_1_f(x0)/Assignment_2_1_derivative(x0));
4  n=0;
5  fprintf('x(%1d)=%9.8f\n',n,x0)
6  while abs(x1−x0)>10^(−8)
7      x0=x1;
8      x1=x0−(Assignment_2_1_f(x0)/Assignment_2_1_derivative(x0));
9      n=n+1;
10      fprintf('x(%1d)=%9.8f\n',n,x0)
11  end
```

Listing 5: Newton's Method

```
1  x(0)=1.60000000
2  x(1)=1.54843750
3  x(2)=1.56342463
4  x(3)=1.56250093
5  x(4)=1.56250000
```

Listing 6: Newton's Method Output