

Assignment 2 of CISC 2002

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1

```
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

2

```

1 function y = Assignment_2_2_f(x)
2     y=x^2-2;
3 end

```

Listing 7: Function

```
1 x_0=1;
2 x_1=2;
3 e_0=sqrt(2)-x_0;
4 e_1=sqrt(2)-x_1;
5 p=(1+sqrt(5))/2;
6 n=0;
7 while abs(e_1)>10^(-10)
8     t=x_1;
9     x_1= x_1-((x_1-x_0)*Assignment_2_2_f(x_1))/(Assignment_2_2_f(
10    x_1)-Assignment_2_2_f(x_0));
11    x_0=t;
12    e_0=e_1;
13    e_1=sqrt(2)-x_1;
14    answer=abs(e_1/(e_0^p));
15    n=n+1;
16    fprintf('%2d-th loop,x=%9.8f, %9.8f\n',n,x_1,answer)
17 end
```

Listing 8: Matlab Code

```
1 1-th loop,x=1.33333333, 0.19215339
2 2-th loop,x=1.40000000, 0.83147865
3 3-th loop,x=1.41463415, 0.41005503
4 4-th loop,x=1.41421144, 0.61638883
5 5-th loop,x=1.41421356, 0.47672494
6 6-th loop,x=1.41421356, 0.52332385
```

Listing 9: Output