Outputs of Secant Method:

Output 1:

a. Solution

```
PS D:\Engineering_BEI\Sem IV\Numerical Methods\NM_Lab\Lab4_Secant_method> gcc 01.c
PS D:\Engineering_BEI\Sem IV\Numerical Methods\NM_Lab\Lab4_Secant_method> .\a.exe
Enter values of initial guesses x0 and x1:2 3
Enter absolute value of tolerable error e:0.00001
Enter maximum number of iterations N:10
-------------------------------------------------------------------------
Iterations      x0              x1              x2              f(x2)
-------------------------------------------------------------------------

1       2.000000        3.000000        2.058824        -0.390799

2       3.000000        2.058824        2.081264        -0.147203

3       2.058824        2.081264        2.094824        0.003043

4       2.081264        2.094824        2.094549        -0.000023

5       2.094824        2.094549        2.094552        0.000001
-------------------------------------------------------------------------
The approximate root is: 2.094551563
PS D:\Engineering_BEI\Sem IV\Numerical Methods\NM_Lab\Lab4_Secant_method>
```

b. Mathematical error case

```
PS D:\Engineering_BEI\Sem IV\Numerical Methods\NM_Lab\Lab4_Secant_method> .\a.exe
Enter values of initial guesses x0 and x1:2 2
Enter absolute value of tolerable error e:0.0001
Enter maximum number of iterations N:10
-------------------------------------------------------------------------
Iterations      x0              x1              x2              f(x2)
-------------------------------------------------------------------------
Mathematical error.
PS D:\Engineering_BEI\Sem IV\Numerical Methods\NM_Lab\Lab4_Secant_method>
```

c. Not convergent case

```
PS D:\Engineering_BEI\Sem IV\Numerical Methods\NM_Lab\Lab4_Secant_method> gcc 01.c
PS D:\Engineering_BEI\Sem IV\Numerical Methods\NM_Lab\Lab4_Secant_method> .\a.exe
Enter values of initial guesses x0 and x1:2 3
Enter absolute value of tolerable error e:0.000001
Enter maximum number of iterations N:2
-------------------------------------------------------------------------
Iterations      x0              x1              x2              f(x2)
-------------------------------------------------------------------------

1       2.000000        3.000000        2.058824        -0.390799

2       3.000000        2.058824        2.081264        -0.147203
The solution doesnot converge.
PS D:\Engineering_BEI\Sem IV\Numerical Methods\NM_Lab\Lab4_Secant_method>
```

Output 2:

```
PS D:\Engineering_BEI\Sem IV\Numerical Methods\NM_Lab\Lab4_Secant_method> .\a.exe
Enter values of initial guesses x0 and x1:0 1
Enter absolute value of tolerable error e:0.0001
Enter maximum number of iterations N:10
_________________________________________________________________________
Iterations      x0              x1              x2              f(x2)
_________________________________________________________________________

1       0.000000        1.000000        0.470990        0.265159

2       1.000000        0.470990        0.307508        -0.134822

3       0.470990        0.307508        0.362613        0.005479

4       0.307508        0.362613        0.360461        0.000099
_________________________________________________________________________
The approximate root is: 0.360461473
PS D:\Engineering_BEI\Sem IV\Numerical Methods\NM_Lab\Lab4_Secant_method>
```

Output 3:

```
PS D:\Engineering_BEI\Sem IV\Numerical Methods\NM_Lab\Lab4_Secant_method> gcc 3.c
PS D:\Engineering_BEI\Sem IV\Numerical Methods\NM_Lab\Lab4_Secant_method> .\a.exe
Enter values of initial guesses x0 and x1: 1 2
Enter absolute value of tolerable error e:0.0001
Enter maximum number of iterations N:10
```

Iterations	x0	x1	x2	f(x2)
1	1.000000	2.000000	0.832673	1.241793
2	2.000000	0.832673	0.728779	0.764440
3	0.832673	0.728779	0.562401	0.140970
4	0.728779	0.562401	0.524782	0.021497
5	0.562401	0.524782	0.518014	0.000779
6	0.524782	0.518014	0.517759	0.000005

```
The approximate root is: 0.517758846
PS D:\Engineering_BEI\Sem IV\Numerical Methods\NM_Lab\Lab4_Secant_method> .\a.exe
Enter values of initial guesses x0 and x1:
```

Output 4:

```
PS D:\Engineering_BEI\Sem IV\Numerical Methods\NM_Lab\Lab4_Secant_method> .\a.exe
Enter values of initial guesses x0 and x1:2 3
Enter absolute value of tolerable error e:0.0001
Enter maximum number of iterations N:10
```

Iterations	x0	x1	x2	f(x2)
1	2.000000	3.000000	2.588860	0.371910
2	3.000000	2.588860	2.270700	-0.208566
3	2.588860	2.270700	2.385015	0.039225
4	2.270700	2.385015	2.366920	0.003791
5	2.385015	2.366920	2.364983	-0.000074

```
The approximate root is: 2.364983320
PS D:\Engineering_BEI\Sem IV\Numerical Methods\NM_Lab\Lab4_Secant_method>
```

```
PS D:\Engineering_BEI\Sem IV\Numerical Methods\NM_Lab\Lab4_Secant_method> .\a.exe
Enter values of initial guesses x0 and x1:-2 -3
Enter absolute value of tolerable error e:0.00001
Enter maximum number of iterations N:10
```

Iterations	x0	x1	x2	f(x2)
1	-2.000000	-3.000000	-2.588860	-0.371910
2	-3.000000	-2.588860	-2.270700	0.208566
3	-2.588860	-2.270700	-2.385015	-0.039225
4	-2.270700	-2.385015	-2.366920	-0.003791
5	-2.385015	-2.366920	-2.364983	0.000074
6	-2.366920	-2.364983	-2.365021	-0.000000

```
The approximate root is: -2.365020514
PS D:\Engineering_BEI\Sem IV\Numerical Methods\NM_Lab\Lab4_Secant_method>
```

Output 5:

```
PS D:\Engineering_BEI\Sem IV\Numerical Methods\NM_Lab\Lab4_Secant_method> gcc 5.c
PS D:\Engineering_BEI\Sem IV\Numerical Methods\NM_Lab\Lab4_Secant_method> .\a.exe
Enter values of initial guesses x0 and x1:1 2
Enter absolute value of tolerable error e:0.00001
Enter maximum number of iterations N:10
```

Iterations	x0	x1	x2	f(x2)
1	1.000000	2.000000	2.150298	-2.294334
2	2.000000	2.150298	2.020091	0.267581
3	2.150298	2.020091	2.033691	0.069319
4	2.020091	2.033691	2.038446	-0.023978
5	2.033691	2.038446	2.037224	0.001089
6	2.038446	2.037224	2.037277	0.000014
7	2.037224	2.037277	2.037277	-0.000001

```
The approximate root is: 2.037277460
PS D:\Engineering_BEI\Sem IV\Numerical Methods\NM_Lab\Lab4_Secant_method>
```

Output of False Position Method:

```
PS D:\Engineering_BEI\Sem IV\Numerical Methods\NM_Lab\Lab4_Secant_method\Regula_falsi_method> .\a.exe
Enter values of initial guesses x0 and x1:2 3
Enter absolute value of tolerable error e:0.00001
```

Iterations	x0	x1	x2	f(x0)	f(x1)	f(x2)
1	2.000000	3.000000	2.058824	-1.000000	16.000000	-0.390799
2	2.058824	3.000000	2.081264	-0.390799	16.000000	-0.147203
3	2.081264	3.000000	2.089639	-0.147203	16.000000	-0.054677
4	2.089639	3.000000	2.092740	-0.054677	16.000000	-0.020203
5	2.092740	3.000000	2.093884	-0.020203	16.000000	-0.007450
6	2.093884	3.000000	2.094306	-0.007450	16.000000	-0.002745
7	2.094306	3.000000	2.094461	-0.002745	16.000000	-0.001010
8	2.094461	3.000000	2.094518	-0.001010	16.000000	-0.000372
9	2.094518	3.000000	2.094539	-0.000372	16.000000	-0.000137
10	2.094539	3.000000	2.094547	-0.000137	16.000000	-0.000050
11	2.094547	3.000000	2.094550	-0.000050	16.000000	-0.000018
12	2.094550	3.000000	2.094551	-0.000018	16.000000	-0.000007

```
The approximate root is: 2.094551
PS D:\Engineering_BEI\Sem IV\Numerical Methods\NM_Lab\Lab4_Secant_method\Regula_falsi_method>
```

Output of Fixed Point Iteration Method:

```
PS D:\Engineering_BEI\Sem IV\Numerical Methods\NM_Lab\Lab4_Secant_method\Fixed_point_iteration_method> gcc 1.c
PS D:\Engineering_BEI\Sem IV\Numerical Methods\NM_Lab\Lab4_Secant_method\Fixed_point_iteration_method> .\a.exe
Enter initial guess x0: 0.5
Enter tolerable error e: 0.00001
Enter maximum number of iterations N: 15

Iterations      x0              phi(x)
1               0.500000        0.816497
2               0.816497        0.741964
3               0.741964        0.757671
4               0.757671        0.754278
5               0.754278        0.755007
6               0.755007        0.754850
7               0.754850        0.754884
8               0.754884        0.754876

Approximate real root is: 0.754876
PS D:\Engineering_BEI\Sem IV\Numerical Methods\NM_Lab\Lab4_Secant_method\Fixed_point_iteration_method>
```