Instructions for Input and Output

1) It is an interactive I/O system at every point of time you would be asked the desired choice and the code will act accordingly

2) Make sure whenever entering any polynomial enter like: -
$$X.^3 + X.^2 \text{ and not like } X^3 + X^2$$

Otherwise you will see warnings in MATLAB console

3) See the input examples as pasted below these input-output are in order of the pdf file attached with the plots and roots

Q1) Test Function: -

1) $F(X) = 600*x.\char94 4 - 550*x.\char94 3 + 200*x.\char94 2 - 20*x - 1 = 0$

a) Bisection Method: -

Which Question do you want to run first? Enter 1 or 2:- 1

Enter the function in terms of x only:- 600*x.^4 - 550*x.^3 + 200*x.^2 - 20*x - 1

Which method do you want to chose?

(1) Bisection Method

(2) False Position Method

(3) Modified False Position Method

(4) Newton Raphson

(5) Secant Method

Enter value from (1 to 5): 1

Enter the first starting value: 0.1

Enter the second starting value: 1

Enter the maximum number of iterations to consider: 20

Enter the maximum relative error in %: 0.05

ans =

'The stopping criteria due to which the program terminated was the RELATIVE ERROR RECEIVED WAS LESS THAN THE VALUE GIVEN'

ans =

'The required root of the equation is: 0.232385'

b) False Position Method: -

```
Which Question do you want to run first? Enter 1 or 2:-  1

Enter the function in terms of x only:- 600*x.^4 - 550*x.^3 +
200*x.^2 - 20*x - 1

Which method do you want to chose?

(1)Bisection Method

(2)False Position Method

(3)Modified False Position Method

(4)Newton Raphson

(5)Secant Method

Enter value from (1 to 5): 2

Enter the first starting value: 0.1

Enter the second starting value: 1

Enter the maximum number of iterations to consider: 20

Enter the maximum relative error in %: 0.05
```

ans =

**'The stopping criteria due to which the program terminated was
the NUMER OF ITERATIONS EXCEEDED'**

ans =

'The required root of the equation is: 0.181460'

c) Modified False Position Method: -

```
Which Question do you want to run first? Enter 1 or 2:-  1

Enter the function in terms of x only:- 600*x.^4 - 550*x.^3 +
200*x.^2 - 20*x - 1

Which method do you want to chose?

(1)Bisection Method

(2)False Position Method

(3)Modified False Position Method

(4)Newton Raphson

(5)Secant Method

Enter value from (1 to 5): 3

Enter the first starting value: 0.1

Enter the second starting value: 1

Enter the maximum number of iterations to consider: 20

Enter the maximum relative error in %: 0.05
```

ans =

   **'The stopping criteria due to which the program terminated was
the RELATIVE ERROR RECEIVED WAS LESS THAN THE VALUE GIVEN'**

ans =

   'The required root of the equation is: 0.232384'

d) Newton Raphson Method: -

Which Question do you want to run first? Enter 1 or 2:- 1

Enter the function in terms of x only:- 600*x.^4 - 550*x.^3 + 200*x.^2 - 20*x - 1

Which method do you want to chose?

(1)Bisection Method

(2)False Position Method

(3)Modified False Position Method

(4)Newton Raphson

(5)Secant Method

Enter value from (1 to 5): 4

Enter the first starting value: 0.5

Enter the maximum number of iterations to consider: 20

Enter the maximum relative error in %: 0.05

ans =

    'The stopping criteria due to which the program terminated was the RELATIVE ERROR RECEIVED WAS LESS THAN THE VALUE GIVEN'

ans =

    'The required root of the equation is: 0.232353'

e) Secant Method: -

Which Question do you want to run first? Enter 1 or 2:- 1

Enter the function in terms of x only:- 600*x.^4 - 550*x.^3 + 200*x.^2 - 20*x - 1

Which method do you want to chose?

(1)Bisection Method

(2)False Position Method

(3)Modified False Position Method

(4)Newton Raphson

(5)Secant Method

Enter value from (1 to 5): 5

Enter the first starting value: 0.1

Enter the second starting value: 1

Enter the maximum number of iterations to consider: 20

Enter the maximum relative error in %: 0.05

ans =

   'The stopping criteria due to which the program terminated was the RELATIVE ERROR RECEIVED WAS LESS THAN THE VALUE GIVEN'

ans =

   'The required root of the equation is: 0.232353'

Equation 2: - F(X) = exp(-x) – x = 0

a) Bisection Method: -

Which Question do you want to run first? Enter 1 or 2:- 1

Enter the function in terms of x only:- exp(-x) - x

Which method do you want to chose?

(1) Bisection Method

(2) False Position Method

(3) Modified False Position Method

(4) Newton Raphson

(5) Secant Method

Enter value from (1 to 5): 1

Enter the first starting value: 0

Enter the second starting value: 1

Enter the maximum number of iterations to consider: 20

Enter the maximum relative error in %: 0.05

ans =

   'The stopping criteria due to which the program terminated was the RELATIVE ERROR RECEIVED WAS LESS THAN THE VALUE GIVEN'

ans =

   'The required root of the equation is: 0.567139'

b) False Position Method: -

```
Which Question do you want to run first? Enter 1 or 2:-  1

Enter the function in terms of x only:- exp(-x) - x

Which method do you want to chose?

(1)Bisection Method

(2)False Position Method

(3)Modified False Position Method

(4)Newton Raphson

(5)Secant Method

Enter value from (1 to 5): 2

Enter the first starting value: 0

Enter the second starting value: 1

Enter the maximum number of iterations to consider: 20

Enter the maximum relative error in %: 0.05
```

ans =

 **'The stopping criteria due to which the program terminated was
the RELATIVE ERROR RECEIVED WAS LESS THAN THE VALUE GIVEN'**

ans =

 'The required root of the equation is: 0.567150'

c) Modified False Position Method: -

```
Which Question do you want to run first? Enter 1 or 2:-  1

Enter the function in terms of x only:- exp(-x) - x

Which method do you want to chose?

(1)Bisection Method

(2)False Position Method

(3)Modified False Position Method

(4)Newton Raphson

(5)Secant Method

Enter value from (1 to 5): 3

Enter the first starting value: 0

Enter the second starting value: 1

Enter the maximum number of iterations to consider: 20

Enter the maximum relative error in %: 0.05
```

ans =

    **'The stopping criteria due to which the program terminated was
the RELATIVE ERROR RECEIVED WAS LESS THAN THE VALUE GIVEN'**

ans =

    'The required root of the equation is: 0.567197'

d) Newton Raphson Method: -

```
Which Question do you want to run first? Enter 1 or 2:-  1

Enter the function in terms of x only:- exp(-x) - x

Which method do you want to chose?

(1)Bisection Method

(2)False Position Method

(3)Modified False Position Method

(4)Newton Raphson

(5)Secant Method

Enter value from (1 to 5): 4

Enter the first starting value: 0.5

Enter the maximum number of iterations to consider: 20

Enter the maximum relative error in %: 0.05
```

ans =

    'The stopping criteria due to which the program terminated was the RELATIVE ERROR RECEIVED WAS LESS THAN THE VALUE GIVEN'

ans =

    'The required root of the equation is: 0.567143'

e) Secant Method: -

Which Question do you want to run first? Enter 1 or 2:- 1

Enter the function in terms of x only:- exp(-x) - x

Which method do you want to chose?

(1)Bisection Method

(2)False Position Method

(3)Modified False Position Method

(4)Newton Raphson

(5)Secant Method

Enter value from (1 to 5): 5

Enter the first starting value: 0.1

Enter the second starting value: 1

Enter the maximum number of iterations to consider: 20

Enter the maximum relative error in %: 0.05

ans =

   **'The stopping criteria due to which the program terminated was
the RELATIVE ERROR RECEIVED WAS LESS THAN THE VALUE GIVEN'**

ans =

   'The required root of the equation is: 0.567143'

Q2) Test Function: -

1) F(X) = 600*x.^4 - 550*x.^3 + 200*x.^2 - 20*x − 1 = 0

a) Muller Method: -

Which Question do you want to run first? Enter 1 or 2:- 2

Enter the function in terms of x only:- 600*x.^4 - 550*x.^3 + 200*x.^2 - 20*x - 1

Which method do you want to chose?

(1)Muller Method

(2)Bairstow Method

Enter value from (1 to 2): 1

Enter the first starting value: 0

Enter the second starting value: 0.1

Enter the third starting value: 0.3

Enter the maximum number of iterations to consider: 20

Enter the maximum relative error in %: 0.05

ans =

   'The stopping criteria due to which the program terminated was the RELATIVE ERROR RECEIVED WAS LESS THAN THE VALUE GIVEN'

ans =

   'The required root of the equation is: 0.232353'

b) Bairstow Method: -

Which Question do you want to run first? Enter 1 or 2:- 2

Enter the function in terms of x only:- 600*x.^4 - 550*x.^3 + 200*x.^2 - 20*x - 1

Which method do you want to chose?

(1)Muller Method

(2)Bairstow Method

Enter value from (1 to 2): 2

Enter the first starting value: -1

Enter the second starting value: -1

Enter the maximum number of iterations to consider: 20

Enter the maximum relative error in %: 0.05

ans =

   'The stopping criteria due to which the program terminated was the RELATIVE ERROR RECEIVED WAS LESS THAN THE VALUE GIVEN'

All the roots of the given equation are as follows:-

0.232353+0.000000i

-0.035840+0.000000i

0.360077+0.265492i

0.360077-0.265492i

Equation 2: - F(X) = x^3 + x^2 – 4*x - 4 = 0

a) Muller Method: -

Which Question do you want to run first? Enter 1 or 2:- 2

Enter the function in terms of x only:- x.^3 + x.^2 -4*x -4

Which method do you want to chose?

(1)Muller Method

(2)Bairstow Method

Enter value from (1 to 2): 1

Enter the first starting value: 0

Enter the second starting value: 0.5

Enter the third starting value: 1

Enter the maximum number of iterations to consider: 20

Enter the maximum relative error in %: 0.05

ans =

'The stopping criteria due to which the program terminated was the RELATIVE ERROR RECEIVED WAS LESS THAN THE VALUE GIVEN'

ans =

'The required root of the equation is: -1.000000'

b) Bairstow Method:-

Which Question do you want to run first? Enter 1 or 2:- 2

Enter the function in terms of x only:- x.^3 + x.^2 -4*x -4

Which method do you want to chose?

(1)Muller Method

(2)Bairstow Method

Enter value from (1 to 2): 2

Enter the first starting value: -1

Enter the second starting value: -1

Enter the maximum number of iterations to consider: 20

Enter the maximum relative error in %: 0.05

ans =

   'The stopping criteria due to which the program terminated was the RELATIVE ERROR RECEIVED WAS LESS THAN THE VALUE GIVEN'

All the roots of the given equation are as follows:-

2.000000+0.000000i

-1.000000+0.000000i

-2.000000+0.000000i

All commands and outputs end here