Alexandria University
Faculty of Engineering
Computer and Communication Department

Subject

Final Project (Part 2)

Done By

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Introduction :

In this part of Final Project (Part 2) , it is required to write a program to implement a General Signal Generator that interfaces directly with user , takes some parameters from user such as (Sampling frequency of the signal , start and end of time scale and number of break points and their positions) , ask about the specification of the signal for each region in the time limit whether the signal existed in a specific region is (DC Signal , Ramp Signal General order polynomial , Exponential Signal and Sinusoidal Signal), display the resulted signal in time domain , ask the user about the desired operations to be implemented on the signal such as (Amplitude Scaling , Time Reversal , Time Shift left and right and Time Scaling expansion or compression) , ask the user if there are no desired operations to be implemented and finally the program should display the new modified signal in time domain , after implementing and coding the program it is required to make at least 10 assumptions for generating different signals with different time limits , breaking points and signal specifications , covering all the program options , and finally to include all the resulted figures in addition to source codes (.m Files) in a single PDF report in order to be submitted .

Discussion :

- By making 15 assumptions for different signals with different time limits , breaking points and signal specifications covering all the program options as follows :

1. (Assumption 1)

a) Primary Parameters :

```
Command Window
************* Welcome To General Signal Generator *************
---------------------------------
Enter the Sampling Frequency ( Fs ) : 1000
---------------------------------
Enter the Start of Time Scale : -4
---------------------------------
Enter the End of Time Scale : 7
---------------------------------
Enter Number of the Break points : 4
---------------------------------
Enter the Positions of the Break points : [ -1 1 4 5 ]
---------------------------------
```

Figure 1.1

b) *Signals Specifications for each region* :

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
---------------------------------
Enter the Type of the Signal from 1 to 5 : 1
---------------------------------
Enter the Amplitude of DC Signal : 1
---------------------------------------------------------------------
```

Figure 1.2

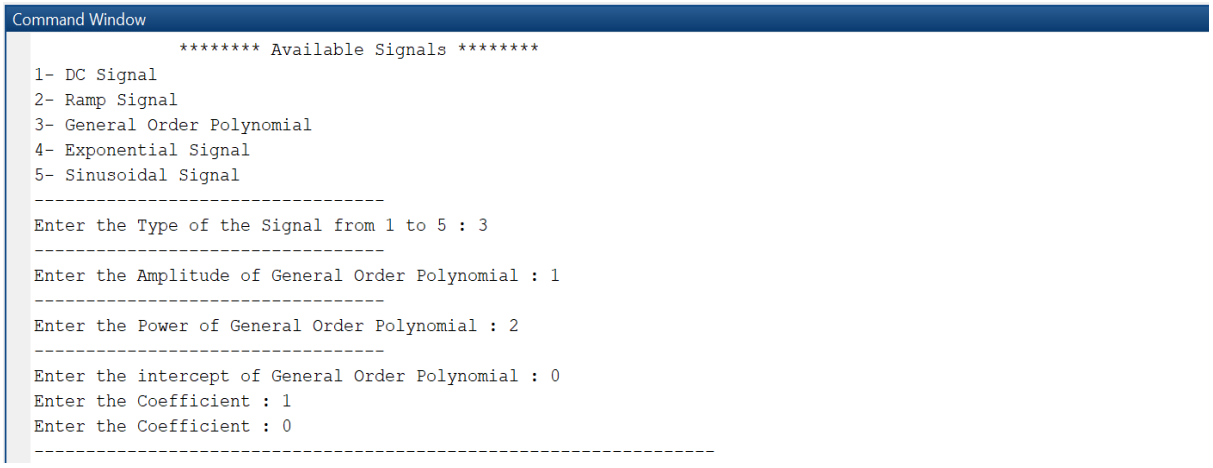


Figure 1.3

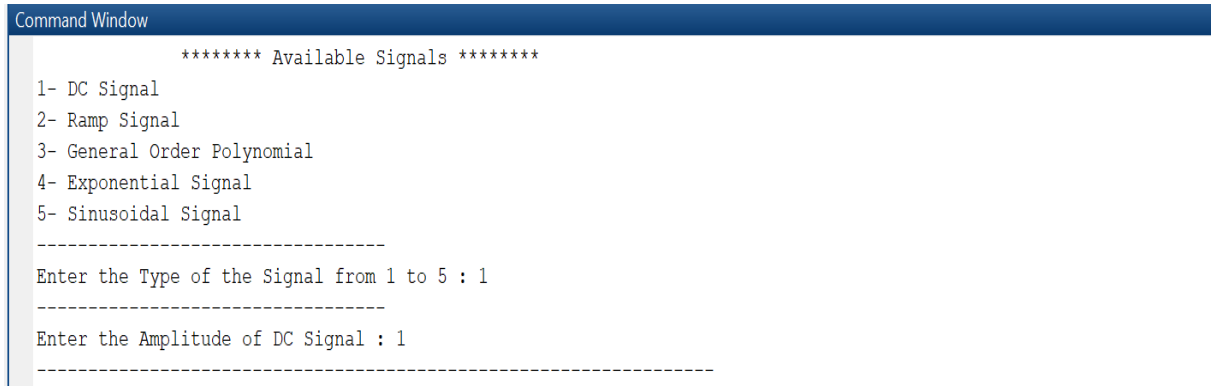


Figure 1.4

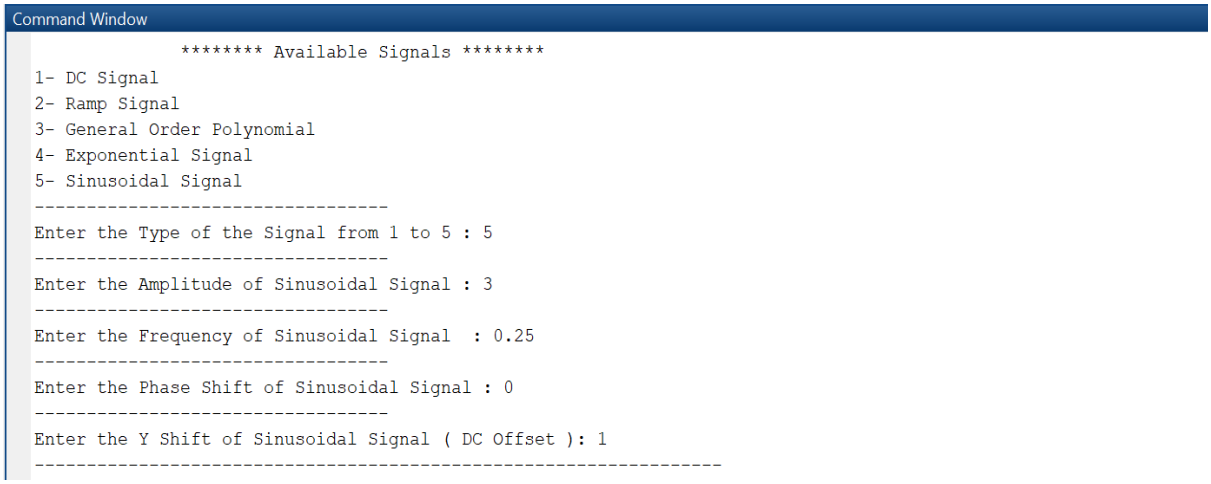


Figure 1.5

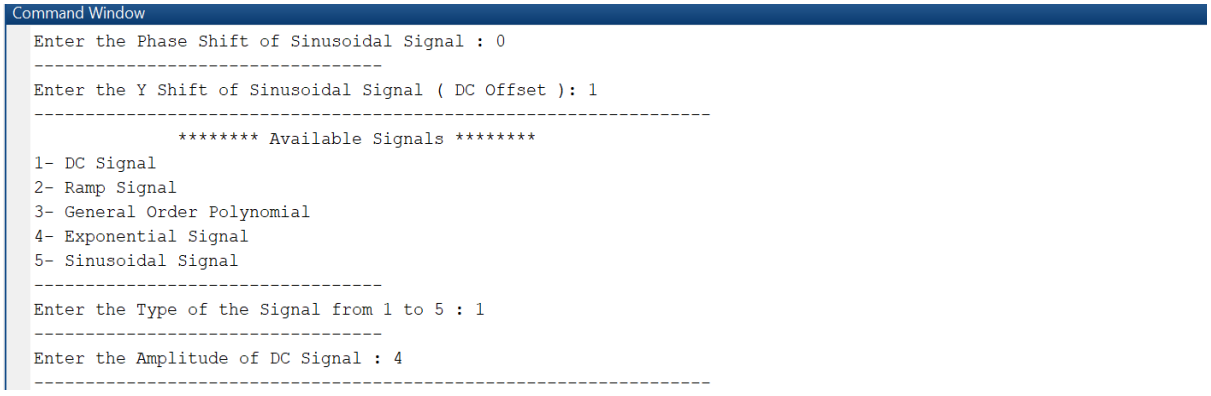


Figure 1.6

c) Display the resulting Signal in Time Domain :

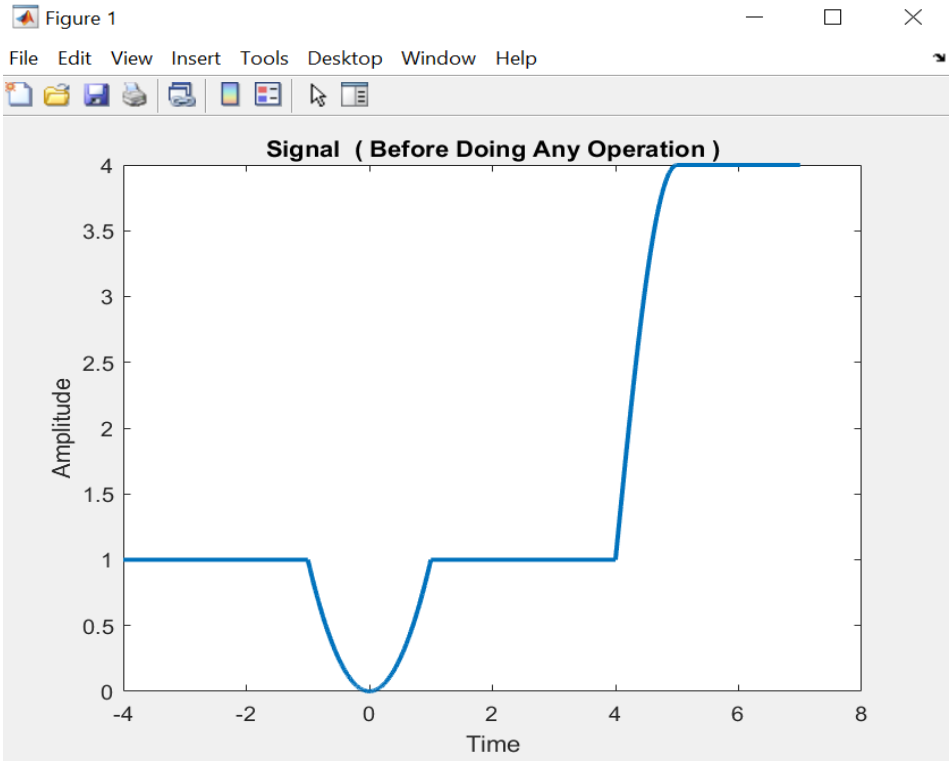


Figure 1.7

d) Required operations to be performed on the Signal :

```
Command Window
              ******** Available Operations ********
-----------------------------------
1- Amplitude Scaling
2- Time Reversal
3- Time Shift
4- Expanding the Signal
5- Compressing the Signal
6- NONE
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 1
-----------------------------------
Enter the Amplitude Scaling Value : 2
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 3
-----------------------------------
Enter the Shift Value (+ve) for Shift Right (-ve) for Shift Left : -4
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 5
-----------------------------------
Enter the Compressing Value : 2
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 6
-----------------------------------
************************** Thank You ***************************
```

Figure 1.8

e) *Display the new modified Signal in Time Domain :*

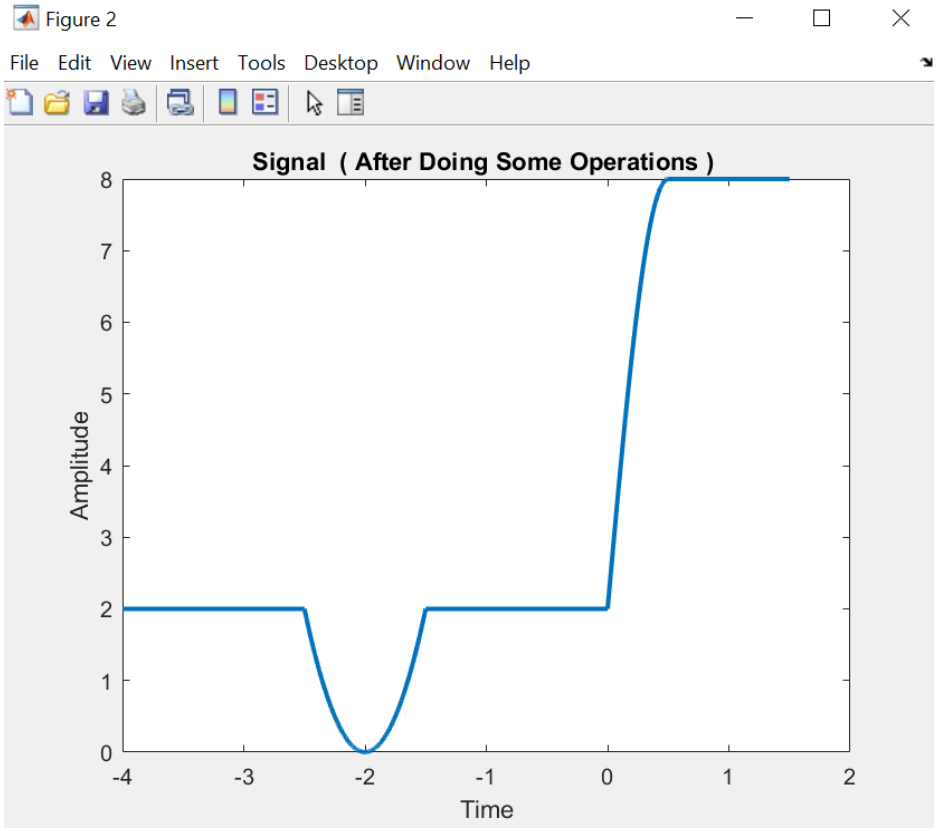


Figure 1.9

2. (Assumption 2)

a) Primary Parameters :

```
Command Window
************* Welcome To General Signal Generator *************
----------------------------------
Enter the Sampling Frequency ( Fs ) : 1000
----------------------------------
Enter the Start of Time Scale : -4
----------------------------------
Enter the End of Time Scale : 4
----------------------------------
Enter Number of the Break points : 2
----------------------------------
Enter the Positions of the Break points : [ -1 1 ]
----------------------------------
```

Figure 2.1

b) Signals Specifications for each region :

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 1
----------------------------------
Enter the Amplitude of DC Signal : 2
---------------------------------------------------------------------
```

Figure 2.2

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 5
----------------------------------
Enter the Amplitude of Sinusoidal Signal : 2
----------------------------------
Enter the Frequency of Sinusoidal Signal  : 0.25
----------------------------------
Enter the Phase Shift of Sinusoidal Signal : pi/2
----------------------------------
Enter the Y Shift of Sinusoidal Signal ( DC Offset ): 2
---------------------------------------------------------------------
```

Figure 2.3

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 1
----------------------------------
Enter the Amplitude of DC Signal : 2
---------------------------------------------------------------------
```

Figure 2.4

c) Display the resulting Signal in Time Domain :

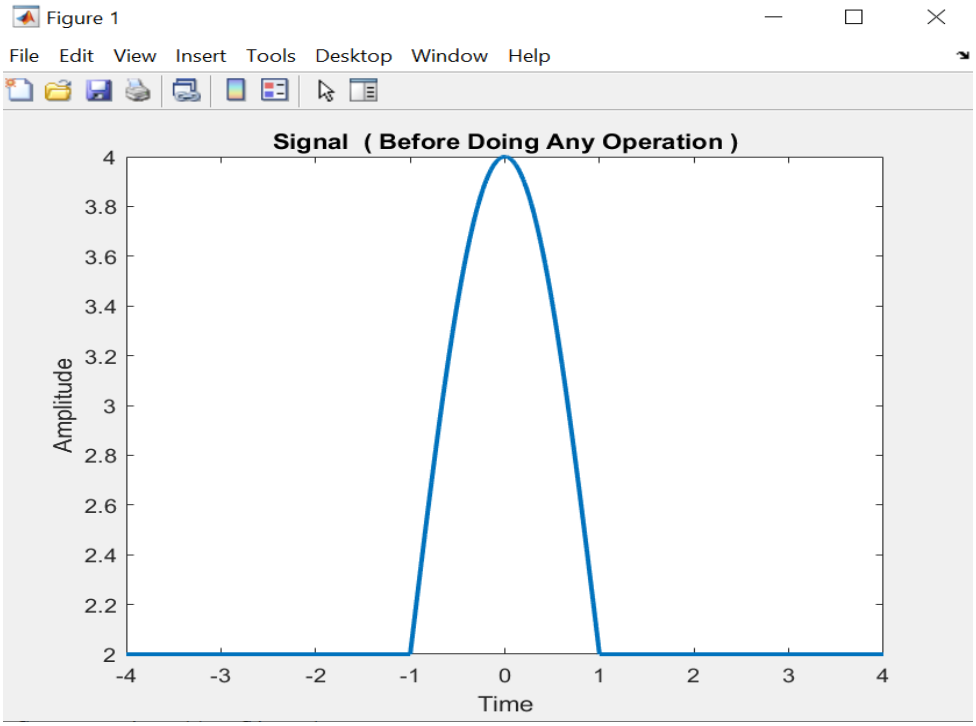


Figure 2.5

d) Required operations to be performed on the Signal :

```
Command Window
              ******** Available Operations ********
-----------------------------------
1- Amplitude Scaling
2- Time Reversal
3- Time Shift
4- Expanding the Signal
5- Compressing the Signal
6- NONE
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 3
-----------------------------------
Enter the Shift Value (+ve) for Shift Right (-ve) for Shift Left : 4
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 2
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 4
-----------------------------------
Enter the Expanding Value : 2
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 6
-----------------------------------
************************** Thank You ***************************
```

Figure 2.6

e) Display the new modified Signal in Time Domain :

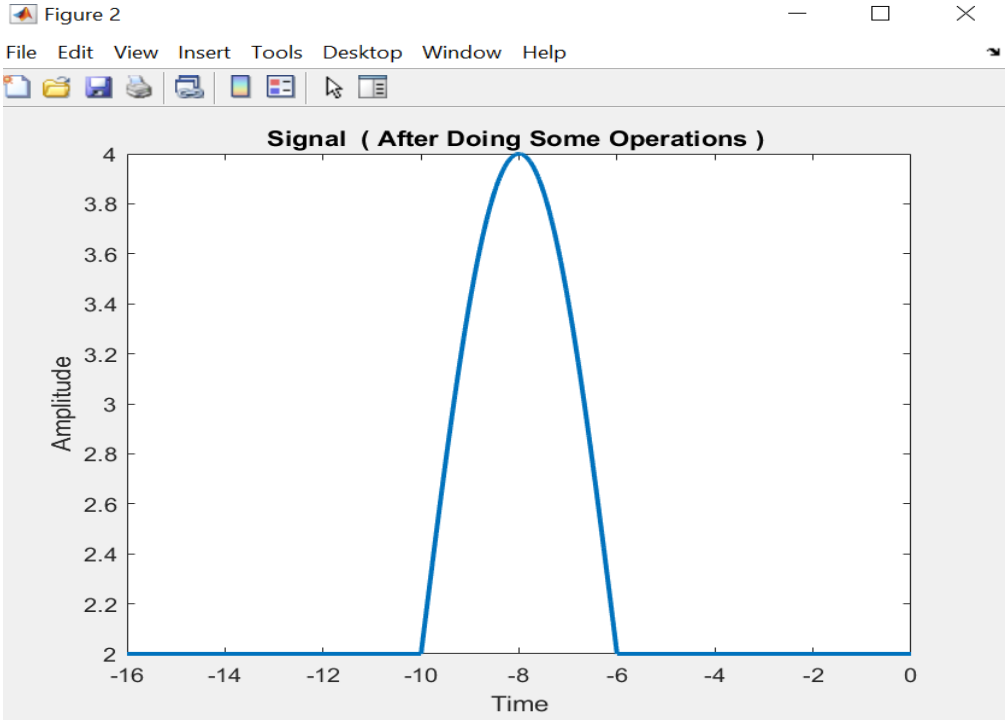


Figure 2.7

3. (Assumption 3)

a) Primary Parameters :

```
Command Window
************* Welcome To General Signal Generator *************
----------------------------------
Enter the Sampling Frequency ( Fs ) : 1000
----------------------------------
Enter the Start of Time Scale : 0
----------------------------------
Enter the End of Time Scale : 4
----------------------------------
Enter Number of the Break points : 3
----------------------------------
Enter the Positions of the Break points : [ 1 2 3 ]
----------------------------------
```

Figure 3.1

b) Signals Specifications for each region :

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 1
----------------------------------
Enter the Amplitude of DC Signal : 1
--------------------------------------------------------------------
```

Figure 3.2

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 1
----------------------------------
Enter the Amplitude of DC Signal : 2
--------------------------------------------------------------------
```

Figure 3.3

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 1
----------------------------------
Enter the Amplitude of DC Signal : -2
--------------------------------------------------------------------
```

Figure 3.4

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 1
----------------------------------
Enter the Amplitude of DC Signal : 4
-----------------------------------------------------------------
```

Figure 3.5

c) *Display the resulting Signal in Time Domain :*

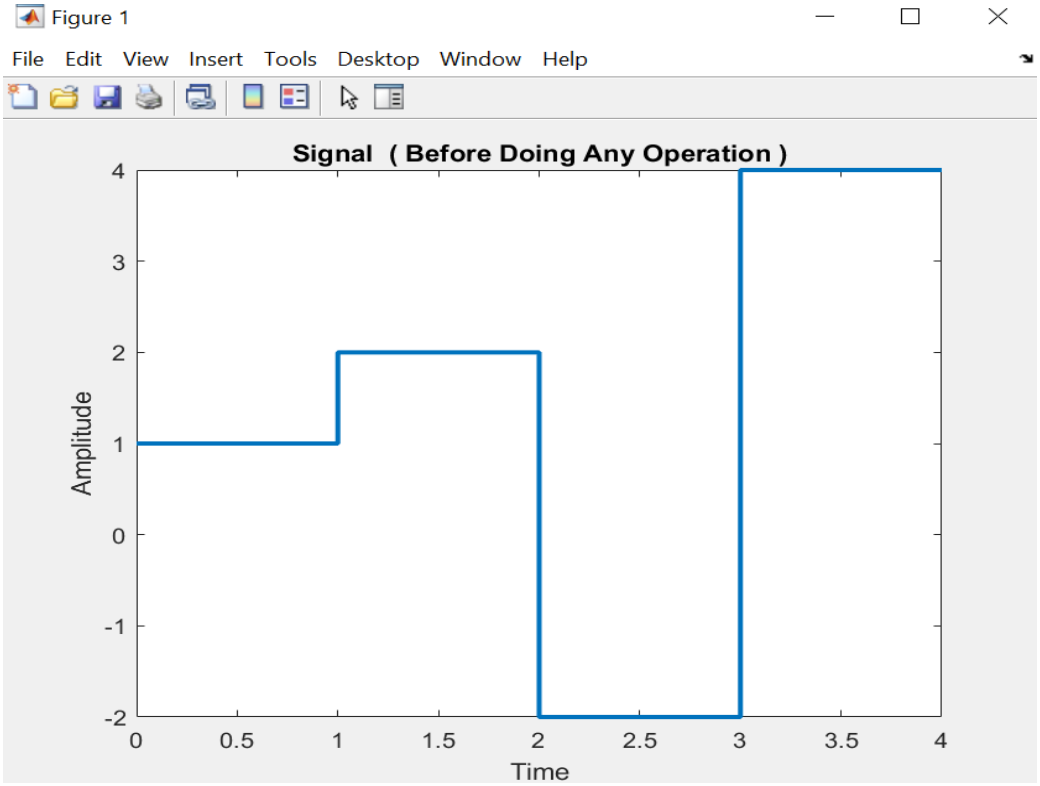


Figure 3.6

d) Required operations to be performed on the Signal :

```
Command Window
              ******** Available Operations ********
----------------------------------
1- Amplitude Scaling
2- Time Reversal
3- Time Shift
4- Expanding the Signal
5- Compressing the Signal
6- NONE
----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 1
----------------------------------
Enter the Amplitude Scaling Value : 2
----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 2
----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 6
----------------------------------
************************** Thank You ****************************
```

Figure 3.7

e) Display the new modified Signal in Time Domain :

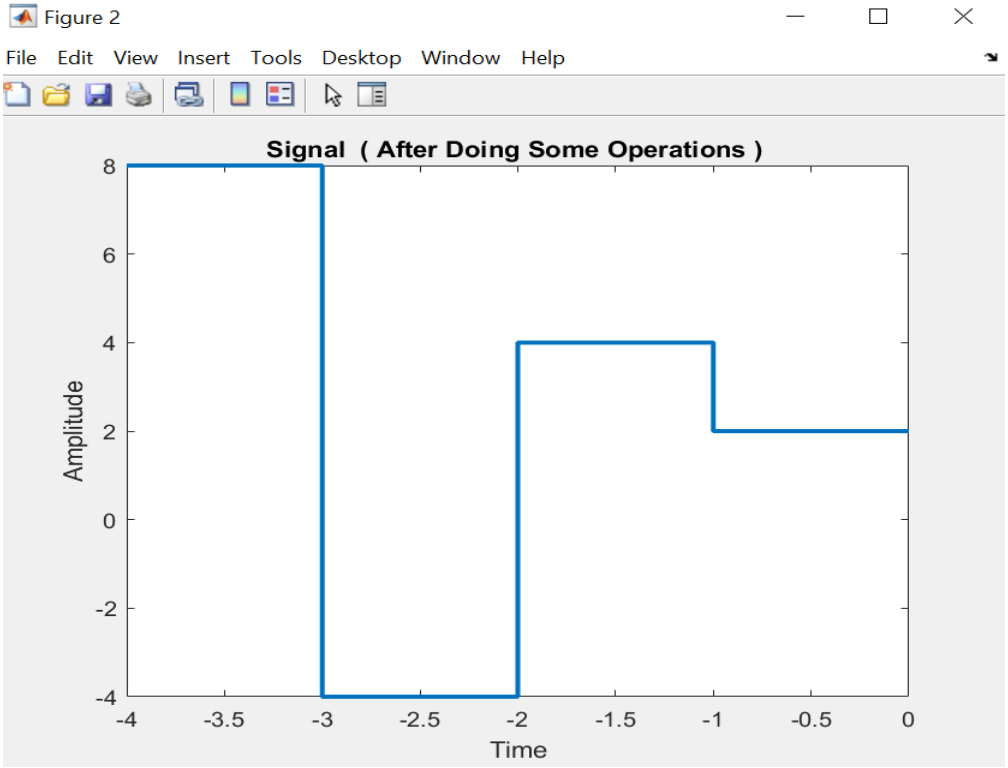


Figure 3.8

4. (Assumption 4)

a) Primary Parameters :

```
Command Window
************* Welcome To General Signal Generator *************
----------------------------------
Enter the Sampling Frequency ( Fs ) : 1000
----------------------------------
Enter the Start of Time Scale : -1
----------------------------------
Enter the End of Time Scale : 3
----------------------------------
Enter Number of the Break points : 1
----------------------------------
Enter the Positions of the Break points : [ 0 ]
----------------------------------
```

Figure 4.1

b) Signals Specifications for each region :

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
-----------------------------------
Enter the Type of the Signal from 1 to 5 : 4
-----------------------------------
Enter the Amplitude of Exponential Signal : 1
-----------------------------------
Enter the Exponent of Exponential Signal : 0.5
-----------------------------------------------------------------------
```

Figure 4.2

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
-----------------------------------
Enter the Type of the Signal from 1 to 5 : 4
-----------------------------------
Enter the Amplitude of Exponential Signal : 1
-----------------------------------
Enter the Exponent of Exponential Signal : -0.5
-----------------------------------------------------------------------
```

Figure 4.3

c) Display the resulting Signal in Time Domain :

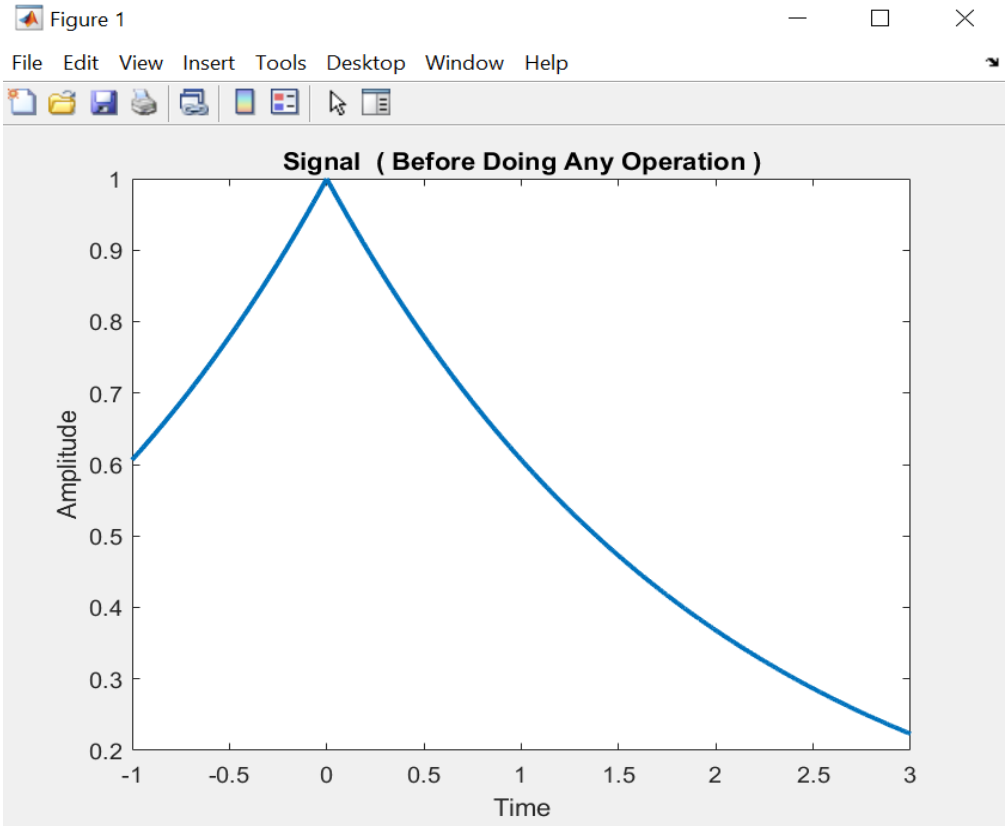


Figure 4.4

d) Required operations to be performed on the Signal :

```
Command Window
              ******** Available Operations ********
----------------------------------
1- Amplitude Scaling
2- Time Reversal
3- Time Shift
4- Expanding the Signal
5- Compressing the Signal
6- NONE
----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 3
----------------------------------
Enter the Shift Value (+ve) for Shift Right (-ve) for Shift Left : -4
----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 2
----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 5
----------------------------------
Enter the Compressing Value : 2
----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 6
----------------------------------
************************** Thank You ****************************
```

Figure 4.5

e) Display the new modified Signal in Time Domain :

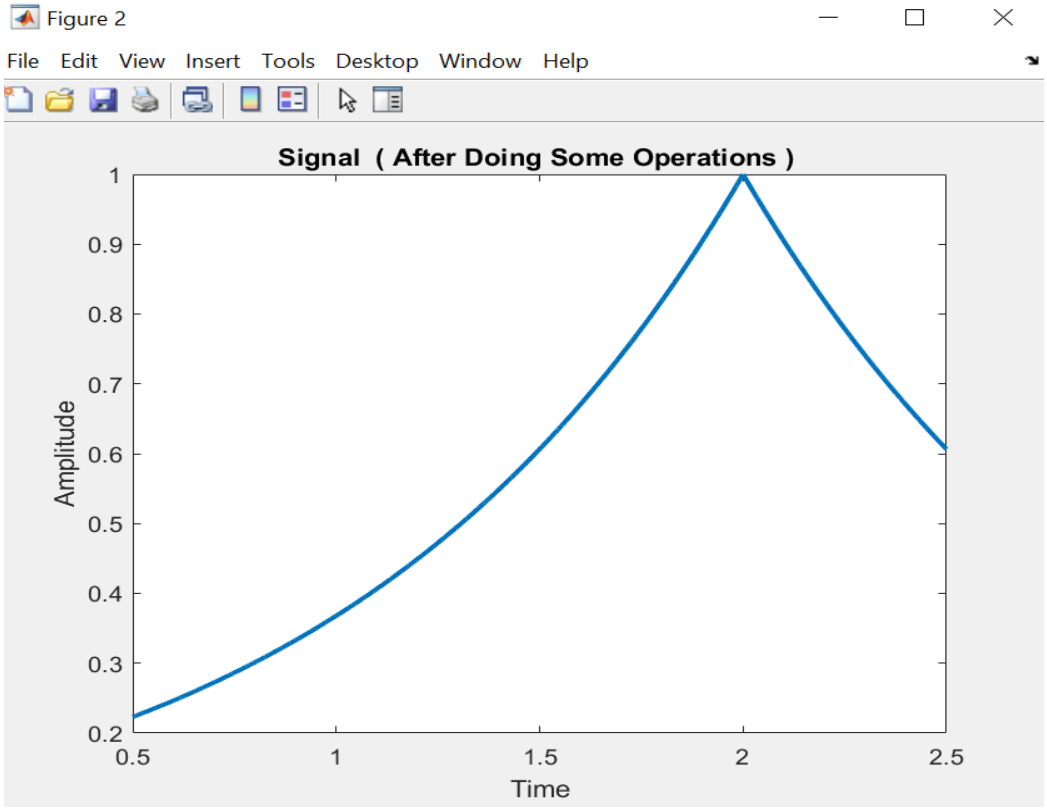


Figure 4.6

5. (Assumption 5)

a) Primary Parameters :

```
Command Window
************* Welcome To General Signal Generator *************
----------------------------------
Enter the Sampling Frequency ( Fs ) : 1000
----------------------------------
Enter the Start of Time Scale : -2
----------------------------------
Enter the End of Time Scale : 5
----------------------------------
Enter Number of the Break points : 2
----------------------------------
Enter the Positions of the Break points : [ 0 1 ]
----------------------------------
```

Figure 5.1

b) Signals Specifications for each region :

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 1
----------------------------------
Enter the Amplitude of DC Signal : 4
-----------------------------------------------------------------
```

Figure 5.2

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 5
----------------------------------
Enter the Amplitude of Sinusoidal Signal : 1
----------------------------------
Enter the Frequency of Sinusoidal Signal  : 0.25
----------------------------------
Enter the Phase Shift of Sinusoidal Signal : pi/2
----------------------------------
Enter the Y Shift of Sinusoidal Signal ( DC Offset ): 3
-----------------------------------------------------------------
```

Figure 5.3

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 1
----------------------------------
Enter the Amplitude of DC Signal : 3
-----------------------------------------------------------------
```

Figure 5.4

c) Display the resulting Signal in Time Domain :

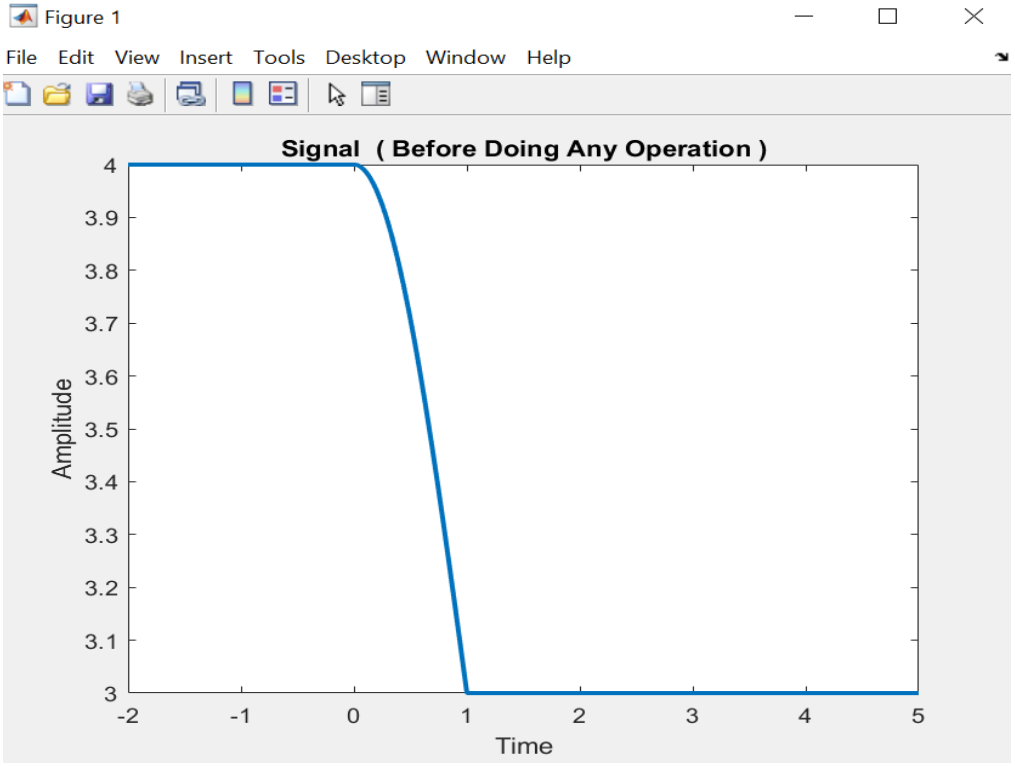


Figure 5.5

d) Required operations to be performed on the Signal :

```
Command Window
              ******** Available Operations ********
-----------------------------------
1- Amplitude Scaling
2- Time Reversal
3- Time Shift
4- Expanding the Signal
5- Compressing the Signal
6- NONE
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 1
-----------------------------------
Enter the Amplitude Scaling Value : 2
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 2
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 5
-----------------------------------
Enter the Compressing Value : 2
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 6
-----------------------------------
************************** Thank You ***************************
```

Figure 5.6

e) Display the new modified Signal in Time Domain :

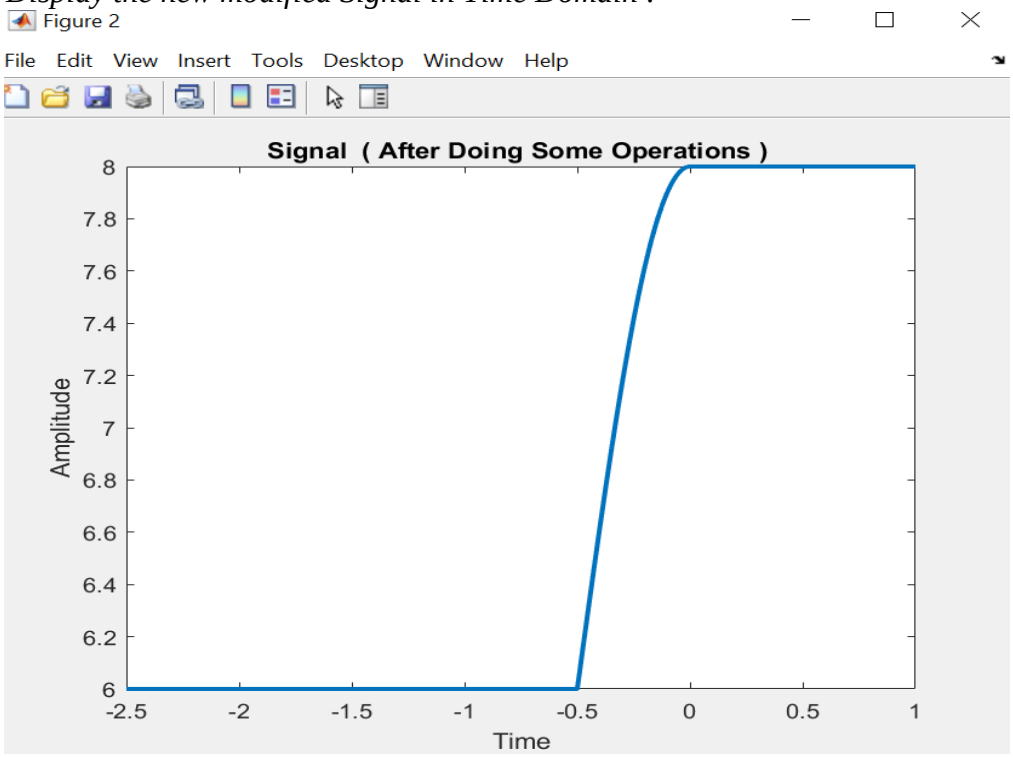


Figure 5.7

6. (Assumption 6)

a) Primary Parameters :

```
Command Window
************* Welcome To General Signal Generator *************
---------------------------------
Enter the Sampling Frequency ( Fs ) : 1000
---------------------------------
Enter the Start of Time Scale : -1
---------------------------------
Enter the End of Time Scale : 7
---------------------------------
Enter Number of the Break points : 4
---------------------------------
Enter the Positions of the Break points : [ 2 3 5 6 ]
---------------------------------
```

Figure 6.1

b) Signals Specifications for each region :

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
---------------------------------
Enter the Type of the Signal from 1 to 5 : 1
---------------------------------
Enter the Amplitude of DC Signal : 0
-----------------------------------------------------------------
```

Figure 6.2

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
---------------------------------
Enter the Type of the Signal from 1 to 5 : 2
---------------------------------
Enter the Slope of Ramp Signal : 2
---------------------------------
Enter the intercept of Ramp Signal : -4
-----------------------------------------------------------------
```

Figure 6.3

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
---------------------------------
Enter the Type of the Signal from 1 to 5 : 1
---------------------------------
Enter the Amplitude of DC Signal : 2
-----------------------------------------------------------------
```

Figure 6.4

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 2
----------------------------------
Enter the Slope of Ramp Signal : -2
----------------------------------
Enter the intercept of Ramp Signal : 12
--------------------------------------------------------------------
```

Figure 6.5

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 1
----------------------------------
Enter the Amplitude of DC Signal : 0
--------------------------------------------------------------------
```

Figure 6.6

c) Display the resulting Signal in Time Domain :

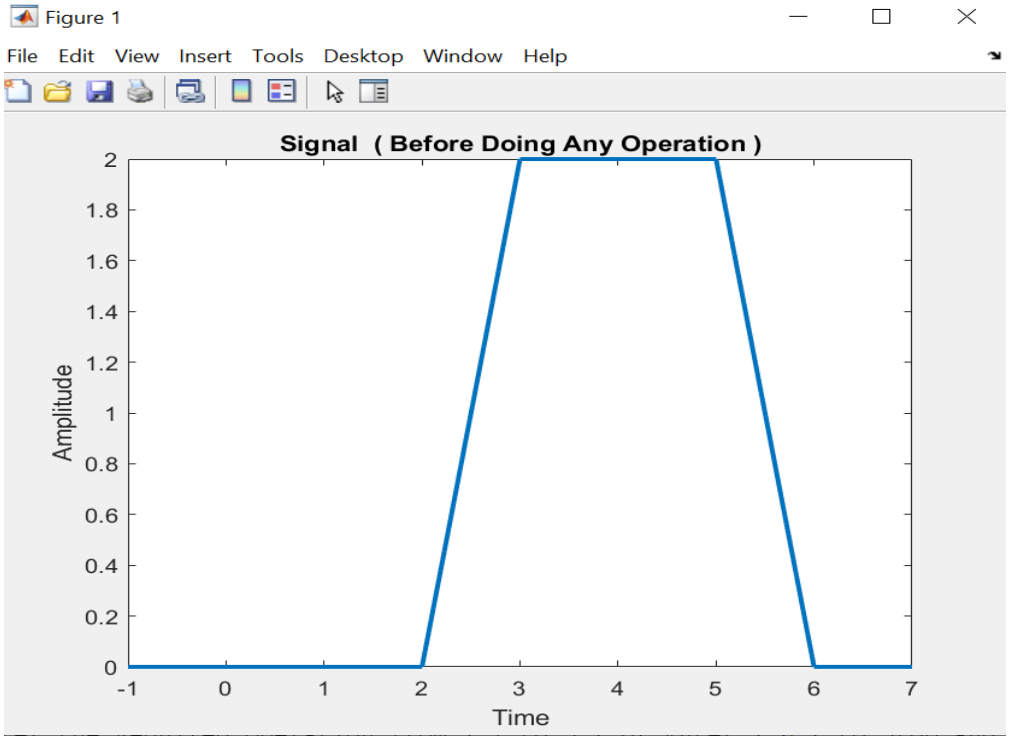


Figure 6.7

d) Required operations to be performed on the Signal :

```
Command Window
              ******** Available Operations ********
----------------------------------
1- Amplitude Scaling
2- Time Reversal
3- Time Shift
4- Expanding the Signal
5- Compressing the Signal
6- NONE
----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 1
----------------------------------
Enter the Amplitude Scaling Value : 2
----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 3
----------------------------------
Enter the Shift Value (+ve) for Shift Right (-ve) for Shift Left : -2
----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 4
----------------------------------
Enter the Expanding Value : 3
----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 6
----------------------------------
************************** Thank You ****************************
```

Figure 6.8

e) Display the new modified Signal in Time Domain :

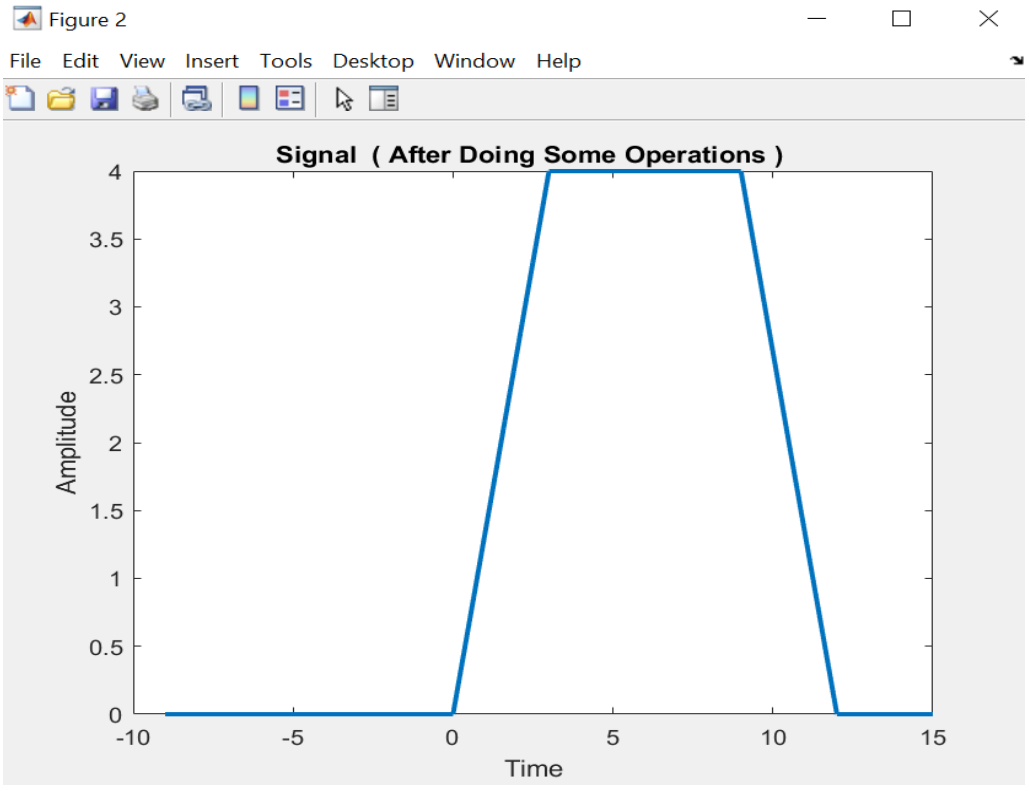


Figure 6.9

7. (Assumption 7)

a) Primary Parameters :

```
Command Window
************* Welcome To General Signal Generator *************
----------------------------------
Enter the Sampling Frequency ( Fs ) : 1000
----------------------------------
Enter the Start of Time Scale : -4
----------------------------------
Enter the End of Time Scale : 5
----------------------------------
Enter Number of the Break points : 2
----------------------------------
Enter the Positions of the Break points : [ -1 1 ]
----------------------------------
```

Figure 7.1

b) Signals Specifications for each region :

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 1
----------------------------------
Enter the Amplitude of DC Signal : -1
-----------------------------------------------------------------------
```

Figure 7.2

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 3
----------------------------------
Enter the Amplitude of General Order Polynomial : 1
----------------------------------
Enter the Power of General Order Polynomial : 3
----------------------------------
Enter the intercept of General Order Polynomial : 0
Enter the Coefficient : 1
Enter the Coefficient : 0
Enter the Coefficient : 0
-----------------------------------------------------------------------
```

Figure 7.3

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 1
----------------------------------
Enter the Amplitude of DC Signal : 1
-----------------------------------------------------------------------
```

Figure 7.4

c) Display the resulting Signal in Time Domain :

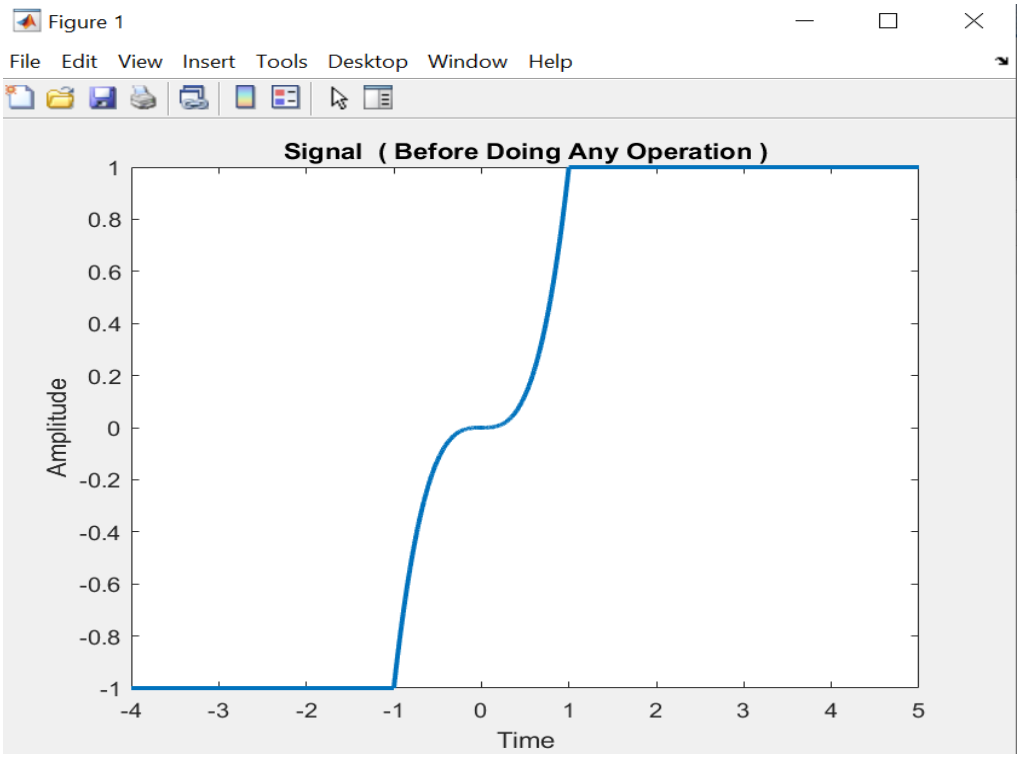


Figure 7.5

d) Required operations to be performed on the Signal :

```
Command Window
              ******** Available Operations ********
-----------------------------------
1- Amplitude Scaling
2- Time Reversal
3- Time Shift
4- Expanding the Signal
5- Compressing the Signal
6- NONE
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 3
-----------------------------------
Enter the Shift Value (+ve) for Shift Right (-ve) for Shift Left : -1
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 2
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 5
-----------------------------------
Enter the Compressing Value : 2
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 6
-----------------------------------
************************** Thank You ****************************
```

Figure 7.6

e) Display the new modified Signal in Time Domain :

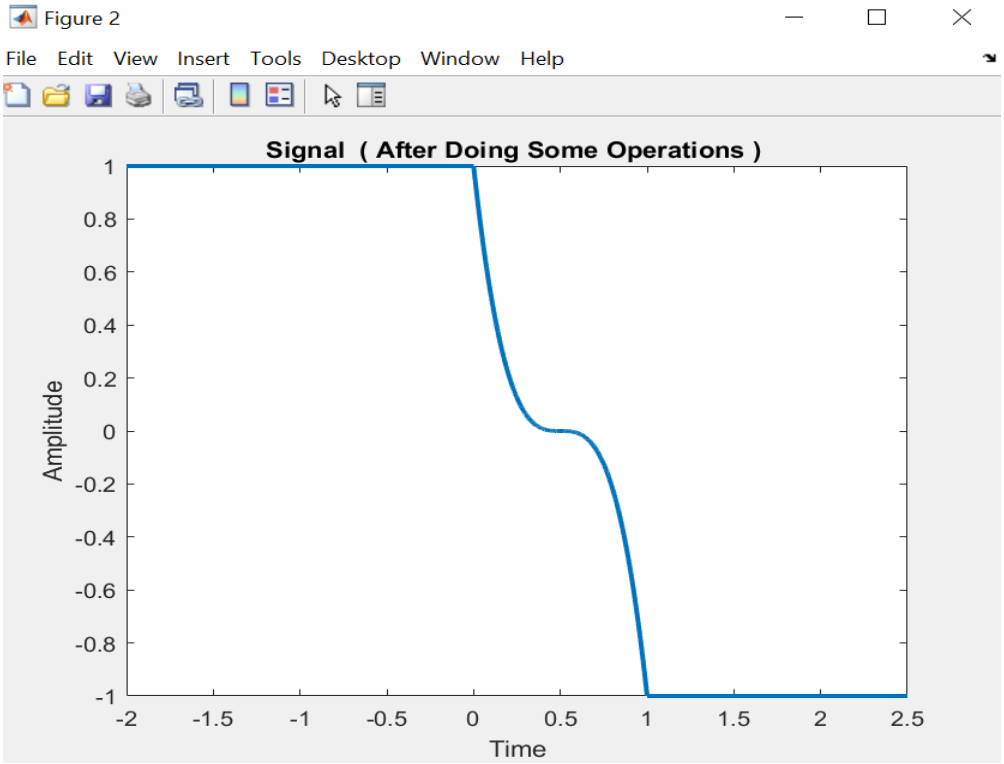


Figure 7.7

8. (Assumption 8)

a) Primary Parameters :

```
Command Window
************* Welcome To General Signal Generator *************
---------------------------------
Enter the Sampling Frequency ( Fs ) : 1000
---------------------------------
Enter the Start of Time Scale : -2
---------------------------------
Enter the End of Time Scale : 4
---------------------------------
Enter Number of the Break points : 2
---------------------------------
Enter the Positions of the Break points : [ -1 0 ]
---------------------------------
```

Figure 8.1

b) Signals Specifications for each region :

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
---------------------------------
Enter the Type of the Signal from 1 to 5 : 1
---------------------------------
Enter the Amplitude of DC Signal : 2
---------------------------------------------------------------------
```

Figure 8.2

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
---------------------------------
Enter the Type of the Signal from 1 to 5 : 2
---------------------------------
Enter the Slope of Ramp Signal : 2
---------------------------------
Enter the intercept of Ramp Signal : 4
---------------------------------------------------------------------
```

Figure 8.3

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
---------------------------------
Enter the Type of the Signal from 1 to 5 : 1
---------------------------------
Enter the Amplitude of DC Signal : 4
---------------------------------------------------------------------
```

Figure 8.4

c) Display the resulting Signal in Time Domain :

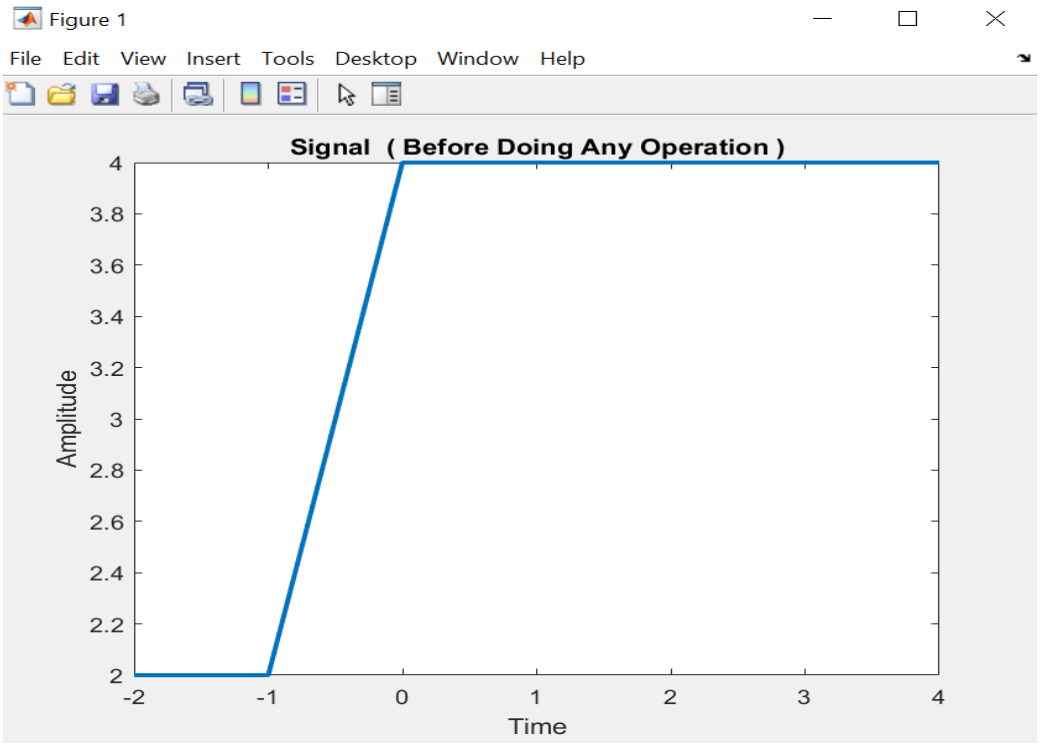


Figure 8.5

d) Required operations to be performed on the Signal :

```
Command Window
              ******** Available Operations ********
----------------------------------
1- Amplitude Scaling
2- Time Reversal
3- Time Shift
4- Expanding the Signal
5- Compressing the Signal
6- NONE
----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 1
----------------------------------
Enter the Amplitude Scaling Value : 2
----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 4
----------------------------------
Enter the Expanding Value : 2
----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 6
----------------------------------
*************************** Thank You ****************************
```

Figure 8.6

e) Display the new modified Signal in Time Domain :

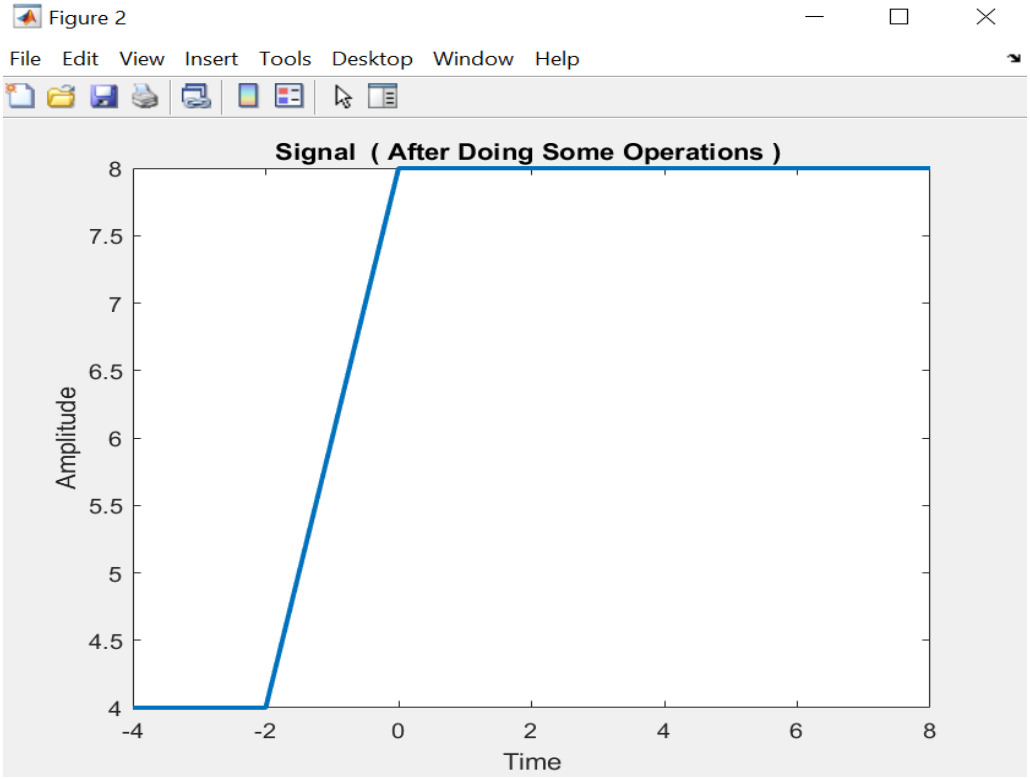


Figure 8.7

9. (Assumption 9)

a) Primary Parameters :

```
Command Window
************* Welcome To General Signal Generator *************
----------------------------------
Enter the Sampling Frequency ( Fs ) : 1000
----------------------------------
Enter the Start of Time Scale : -8
----------------------------------
Enter the End of Time Scale : 5
----------------------------------
Enter Number of the Break points : 2
----------------------------------
Enter the Positions of the Break points : [ -4 0 ]
----------------------------------
```

Figure 9.1

b) Signals Specifications for each region :

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 1
----------------------------------
Enter the Amplitude of DC Signal : 4
--------------------------------------------------------------------
```

Figure 9.2

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 2
----------------------------------
Enter the Slope of Ramp Signal : 1
----------------------------------
Enter the intercept of Ramp Signal : 8
--------------------------------------------------------------------
```

Figure 9.3

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 4
----------------------------------
Enter the Amplitude of Exponential Signal : 8
----------------------------------
Enter the Exponent of Exponential Signal : -2
--------------------------------------------------------------------
```

Figure 9.4

c) Display the resulting Signal in Time Domain :

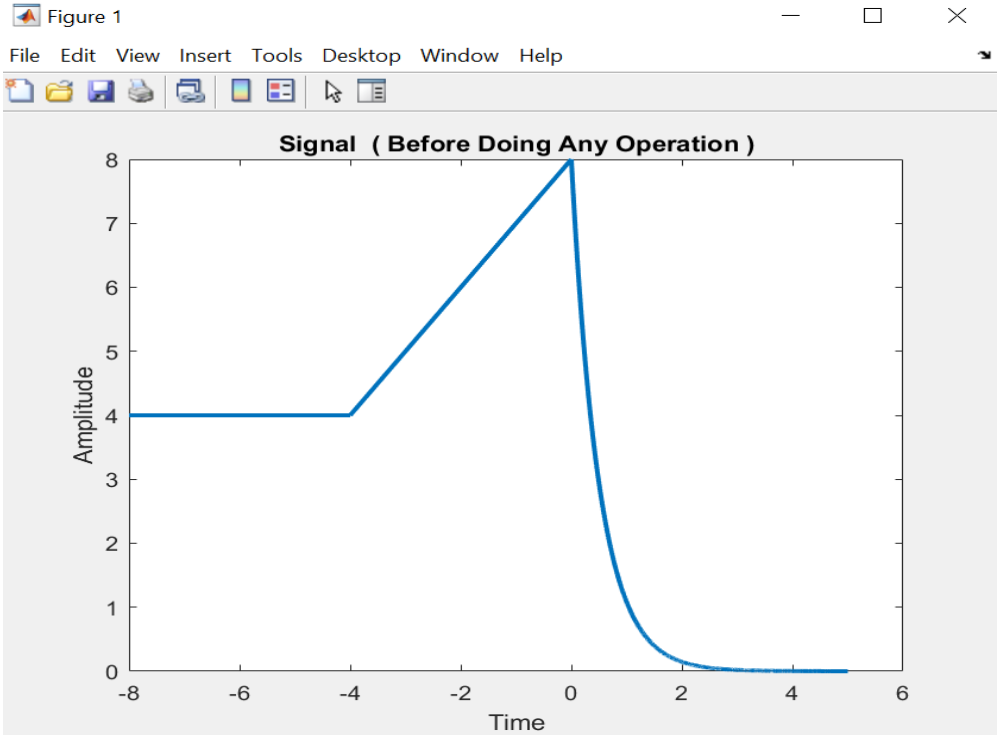


Figure 9.5

d) Required operations to be performed on the Signal :

```
Command Window

              ******** Available Operations ********
-----------------------------------
1- Amplitude Scaling
2- Time Reversal
3- Time Shift
4- Expanding the Signal
5- Compressing the Signal
6- NONE
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 3
-----------------------------------
Enter the Shift Value (+ve) for Shift Right (-ve) for Shift Left : 8
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 2
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 4
-----------------------------------
Enter the Expanding Value : 2
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 6
-----------------------------------
************************** Thank You ****************************
```

Figure 9.6

e) Display the new modified Signal in Time Domain :

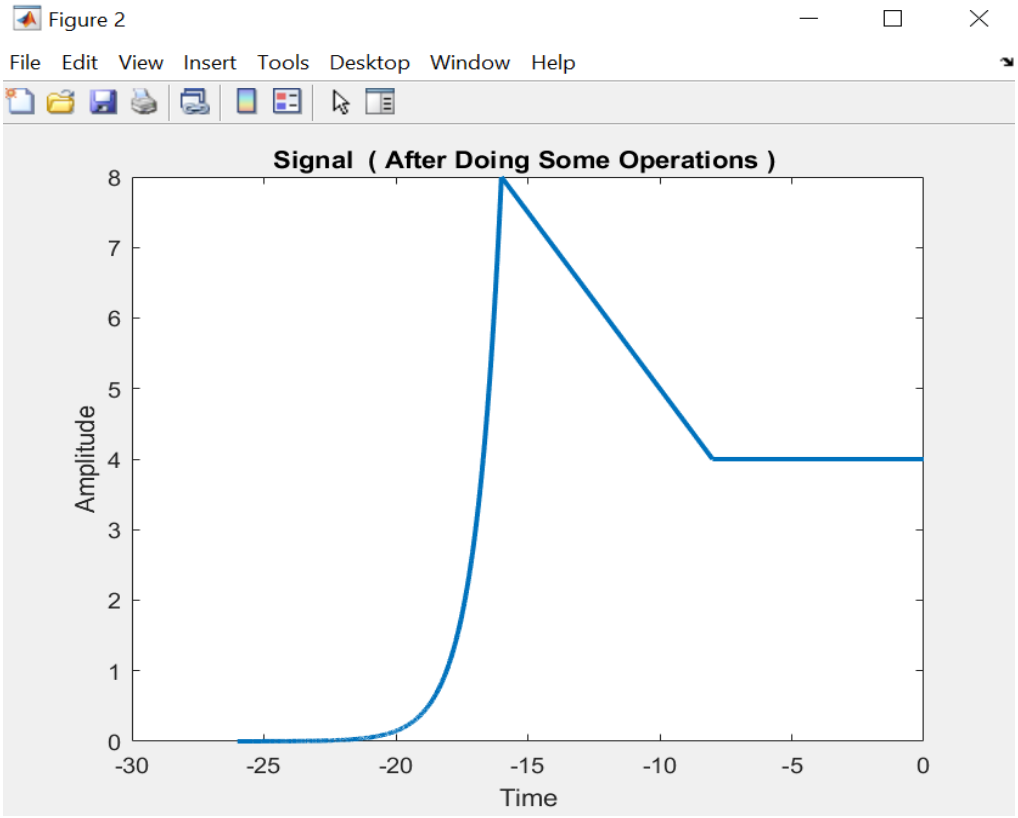


Figure 9.7

10.(Assumption 10)

a) Primary Parameters :

```
Command Window
************* Welcome To General Signal Generator *************
---------------------------------
Enter the Sampling Frequency ( Fs ) : 1000
---------------------------------
Enter the Start of Time Scale : -8
---------------------------------
Enter the End of Time Scale : 8
---------------------------------
Enter Number of the Break points : 5
---------------------------------
Enter the Positions of the Break points : [ -1 1 2 4 6 ]
---------------------------------
```

Figure 10.1

b) Signals Specifications for each region :

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
---------------------------------
Enter the Type of the Signal from 1 to 5 : 1
---------------------------------
Enter the Amplitude of DC Signal : 1
-----------------------------------------------------------------------
```

Figure 10.2

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
---------------------------------
Enter the Type of the Signal from 1 to 5 : 3
---------------------------------
Enter the Amplitude of General Order Polynomial : 1
---------------------------------
Enter the Power of General Order Polynomial : 2
---------------------------------
Enter the intercept of General Order Polynomial : 0
Enter the Coefficient : 1
Enter the Coefficient : 0
-----------------------------------------------------------------------
```

Figure 10.3

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
---------------------------------
Enter the Type of the Signal from 1 to 5 : 1
---------------------------------
Enter the Amplitude of DC Signal : 1
-----------------------------------------------------------------------
```

Figure 10.4

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 2
----------------------------------
Enter the Slope of Ramp Signal : -0.5
----------------------------------
Enter the intercept of Ramp Signal : 2
--------------------------------------------------------------------
```

Figure 10.5

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 2
----------------------------------
Enter the Slope of Ramp Signal : 0.5
----------------------------------
Enter the intercept of Ramp Signal : -2
--------------------------------------------------------------------
```

Figure 10.6

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 1
----------------------------------
Enter the Amplitude of DC Signal : 1
--------------------------------------------------------------------
```

Figure 10.7

c) Display the resulting Signal in Time Domain :

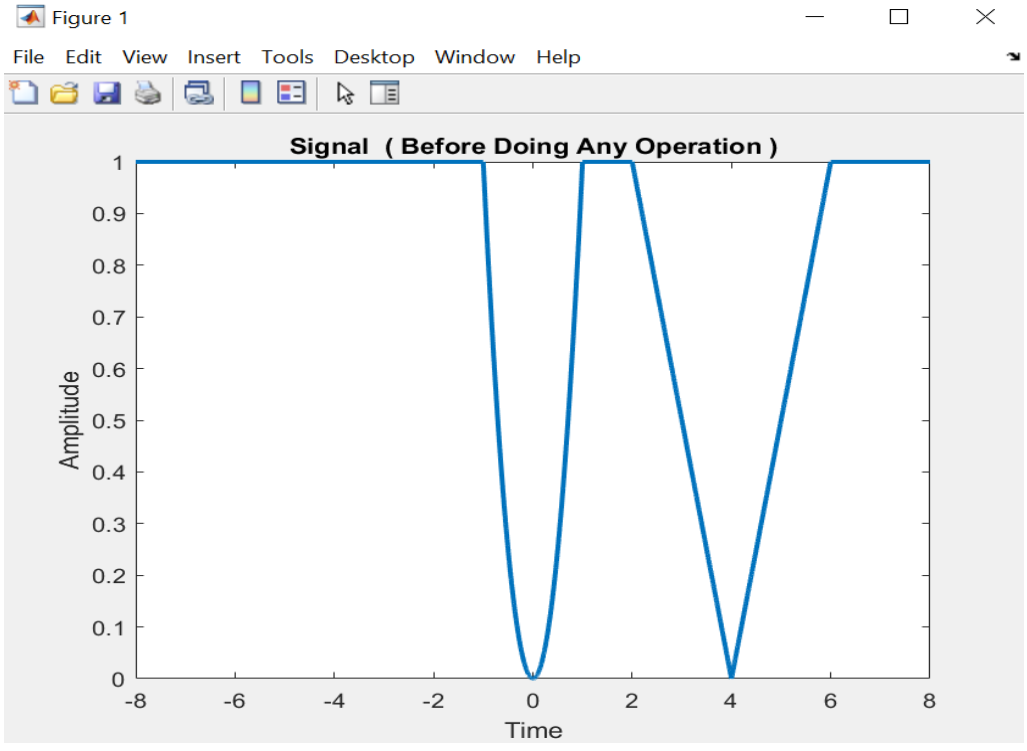


Figure 10.8

d) Required operations to be performed on the Signal :

```
Command Window
              ******** Available Operations ********
-----------------------------------
1- Amplitude Scaling
2- Time Reversal
3- Time Shift
4- Expanding the Signal
5- Compressing the Signal
6- NONE
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 1
-----------------------------------
Enter the Amplitude Scaling Value : 2
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 2
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 5
-----------------------------------
Enter the Compressing Value : 2
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 6
-----------------------------------
************************** Thank You ****************************
```

Figure 10.9

e) Display the new modified Signal in Time Domain :

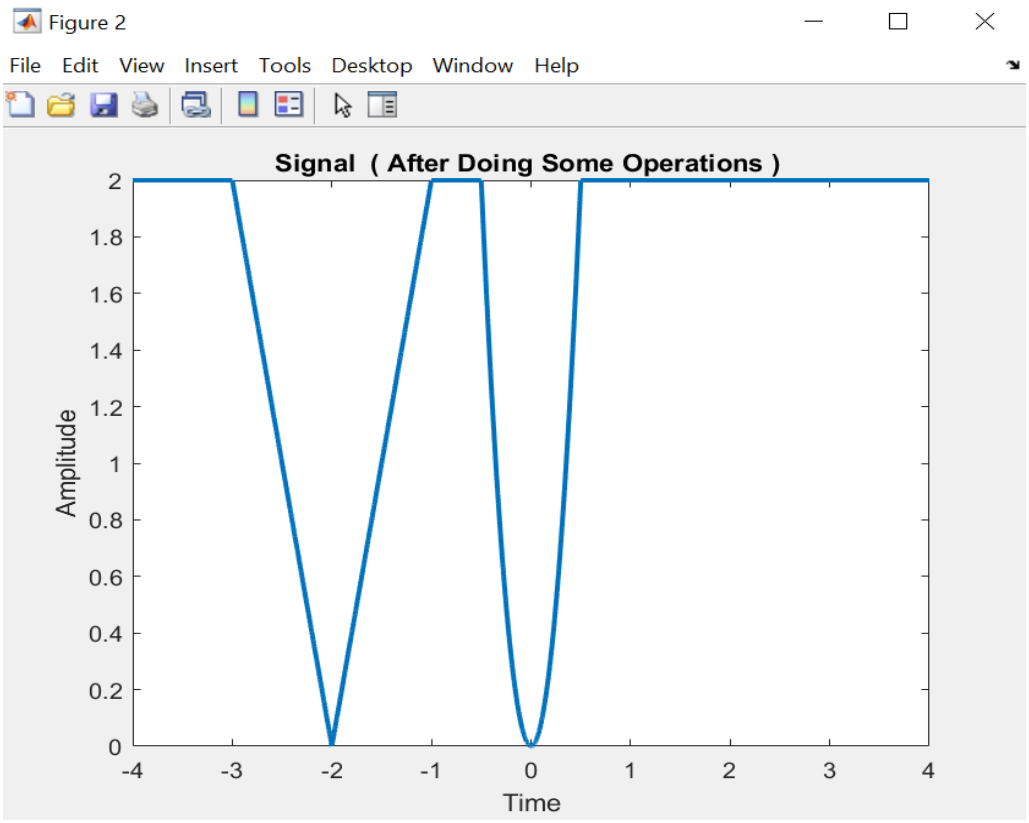


Figure 10.10

11.(Assumption 11)

a) Primary Parameters :

```
Command Window
************* Welcome To General Signal Generator *************
-----------------------------------
Enter the Sampling Frequency ( Fs ) : 1000
-----------------------------------
Enter the Start of Time Scale : -4
-----------------------------------
Enter the End of Time Scale : 5
-----------------------------------
Enter Number of the Break points : 6
-----------------------------------
Enter the Positions of the Break points : [ -3 -1 1 2 3 4 ]
-----------------------------------
```

Figure 11.1

b) Signals Specifications for each region :

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
-----------------------------------
Enter the Type of the Signal from 1 to 5 : 2
-----------------------------------
Enter the Slope of Ramp Signal : -1
-----------------------------------
Enter the intercept of Ramp Signal : -4
-----------------------------------------------------------------------
```

Figure 11.2

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
-----------------------------------
Enter the Type of the Signal from 1 to 5 : 1
-----------------------------------
Enter the Amplitude of DC Signal : -1
-----------------------------------------------------------------------
```

Figure 11.3

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
-----------------------------------
Enter the Type of the Signal from 1 to 5 : 3
-----------------------------------
Enter the Amplitude of General Order Polynomial : 1
-----------------------------------
Enter the Power of General Order Polynomial : 3
-----------------------------------
Enter the intercept of General Order Polynomial : 0
Enter the Coefficient : 1
Enter the Coefficient : 0
Enter the Coefficient : 0
-----------------------------------------------------------------------
```

Figure 11.4

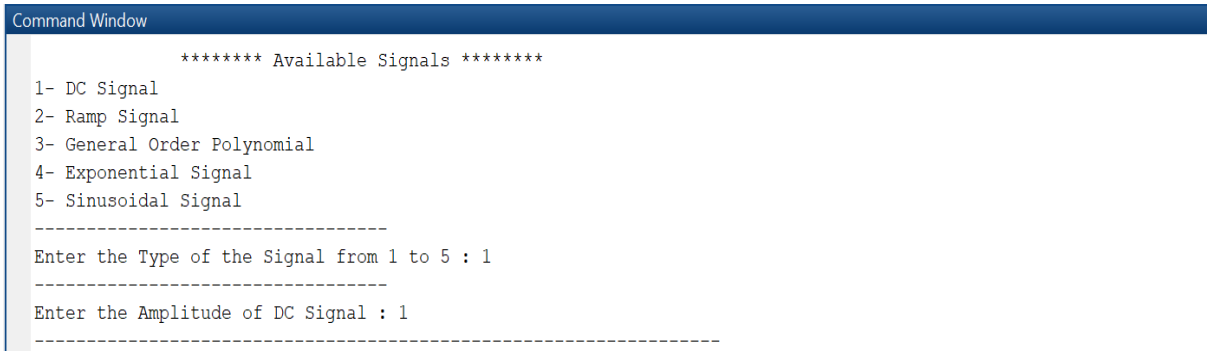


Figure 11.5

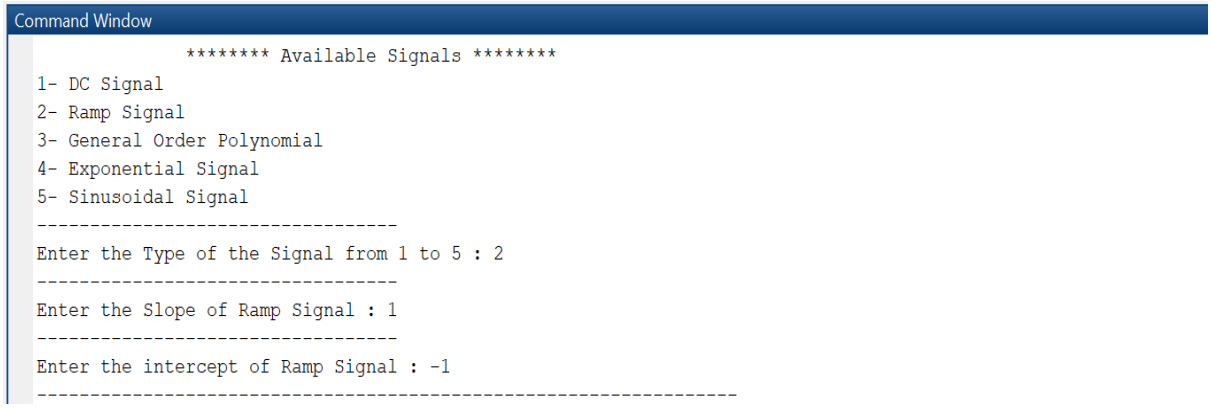


Figure 11.6

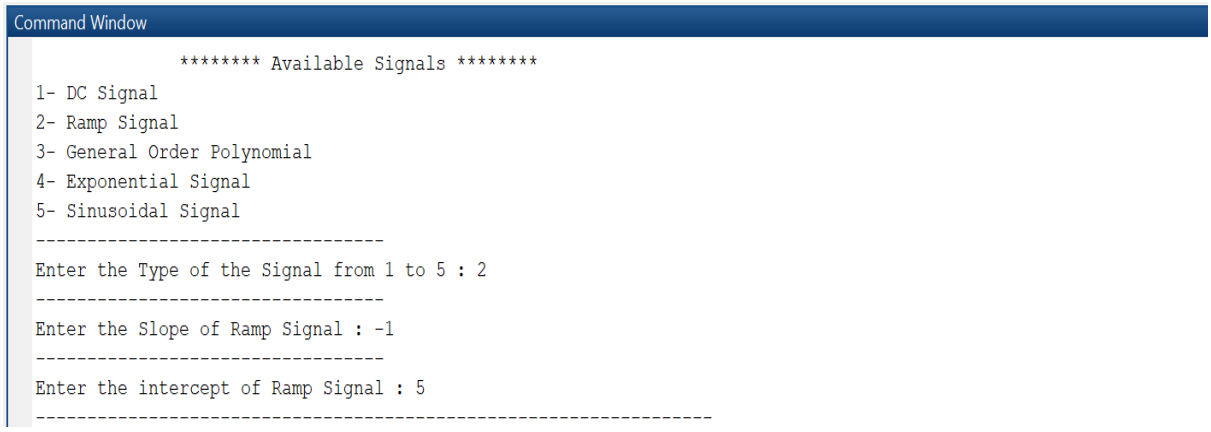


Figure 11.7

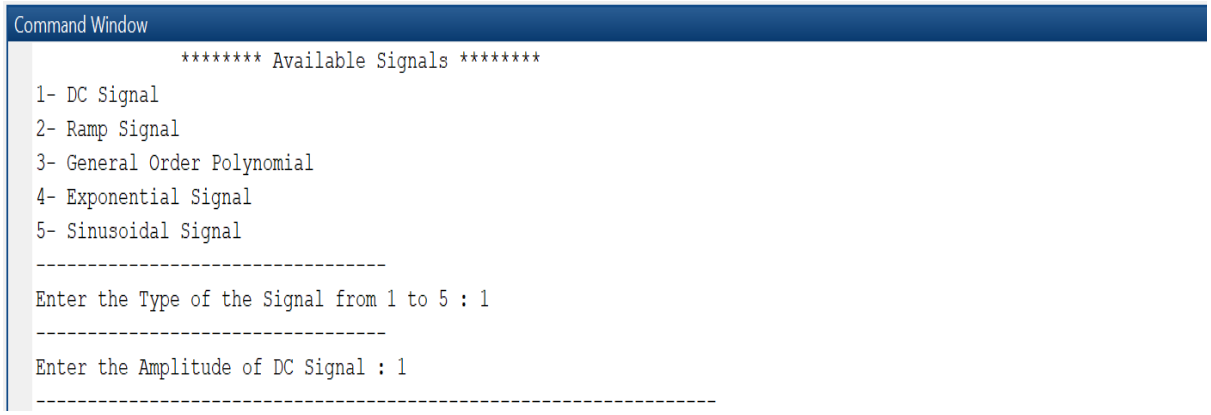


Figure 11.8

c) Display the resulting Signal in Time Domain :

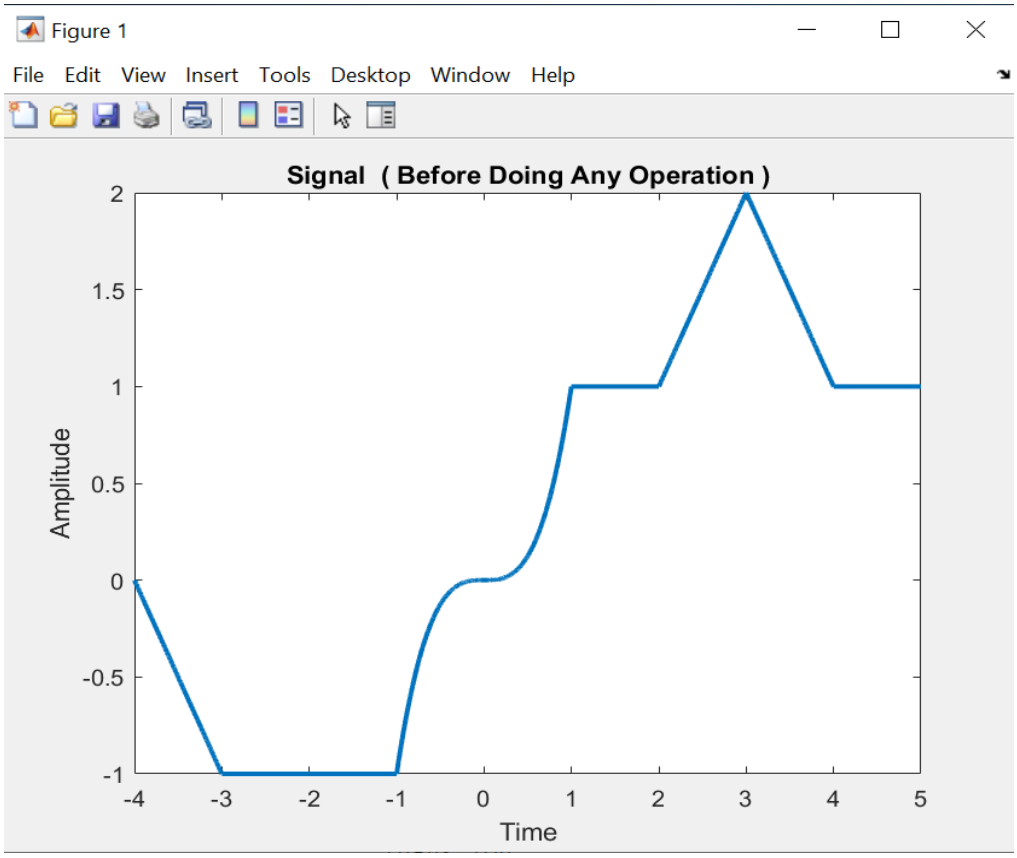


Figure 11.9

d) Required operations to be performed on the Signal :

```
Command Window
             ******** Available Operations ********
---------------------------------
1- Amplitude Scaling
2- Time Reversal
3- Time Shift
4- Expanding the Signal
5- Compressing the Signal
6- NONE
---------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 1
---------------------------------
Enter the Amplitude Scaling Value : 2
---------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 2
---------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 6
---------------------------------
************************** Thank You ***************************
```

Figure 11.10

e) Display the new modified Signal in Time Domain :

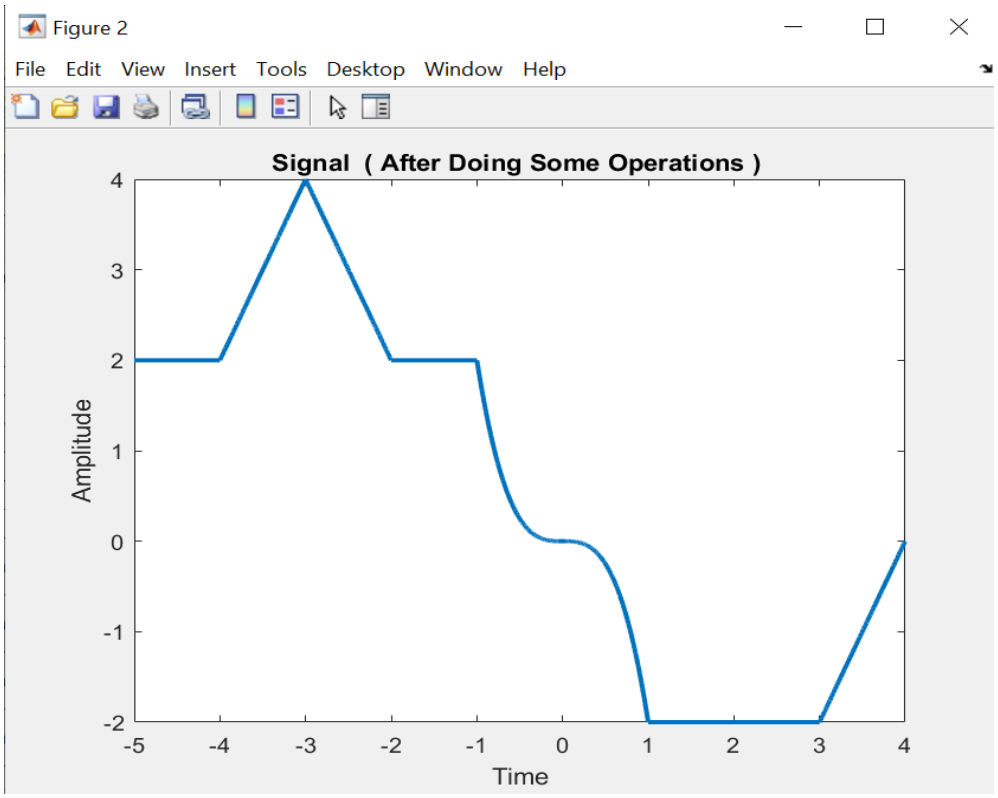


Figure 11.11

12.(Assumption 12)

a) Primary Parameters :

```
Command Window
************* Welcome To General Signal Generator *************
----------------------------------
Enter the Sampling Frequency ( Fs ) : 1000
----------------------------------
Enter the Start of Time Scale : -2
----------------------------------
Enter the End of Time Scale : 3
----------------------------------
Enter Number of the Break points : 3
----------------------------------
Enter the Positions of the Break points : [ -1 0 1 ]
----------------------------------
```

Figure 12.1

b) Signals Specifications for each region :

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 1
----------------------------------
Enter the Amplitude of DC Signal : 0
--------------------------------------------------------------------
```

Figure 12.2

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 2
----------------------------------
Enter the Slope of Ramp Signal : 1
----------------------------------
Enter the intercept of Ramp Signal : 1
--------------------------------------------------------------------
```

Figure 12.3

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 2
----------------------------------
Enter the Slope of Ramp Signal : -1
----------------------------------
Enter the intercept of Ramp Signal : 1
--------------------------------------------------------------------
```

Figure 12.4

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
---------------------------------
Enter the Type of the Signal from 1 to 5 : 1
---------------------------------
Enter the Amplitude of DC Signal : 0
-------------------------------------------------------------------
```

Figure 12.5

c) *Display the resulting Signal in Time Domain :*

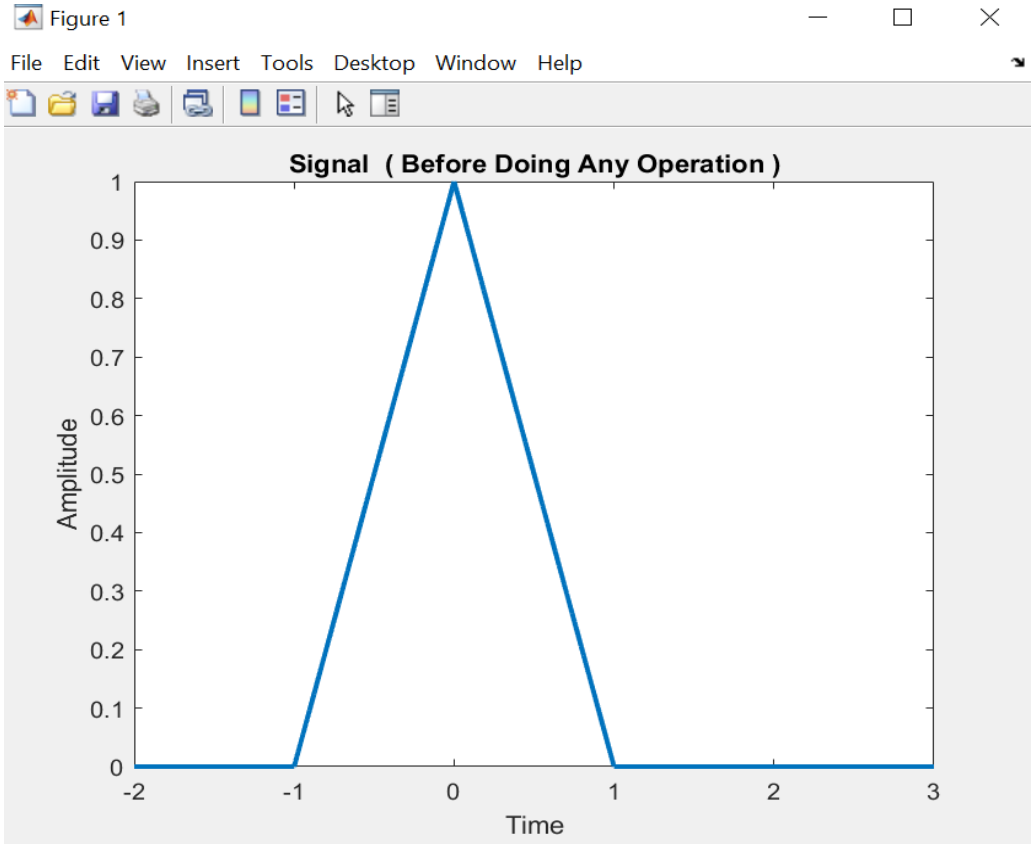


Figure 12.6

d) Required operations to be performed on the Signal :

```
Command Window
              ******** Available Operations ********
-----------------------------------
1- Amplitude Scaling
2- Time Reversal
3- Time Shift
4- Expanding the Signal
5- Compressing the Signal
6- NONE
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 3
-----------------------------------
Enter the Shift Value (+ve) for Shift Right (-ve) for Shift Left : -1
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 1
-----------------------------------
Enter the Amplitude Scaling Value : 6
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 2
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 6
-----------------------------------
*************************** Thank You ****************************
```

Figure 12.7

e) Display the new modified Signal in Time Domain :

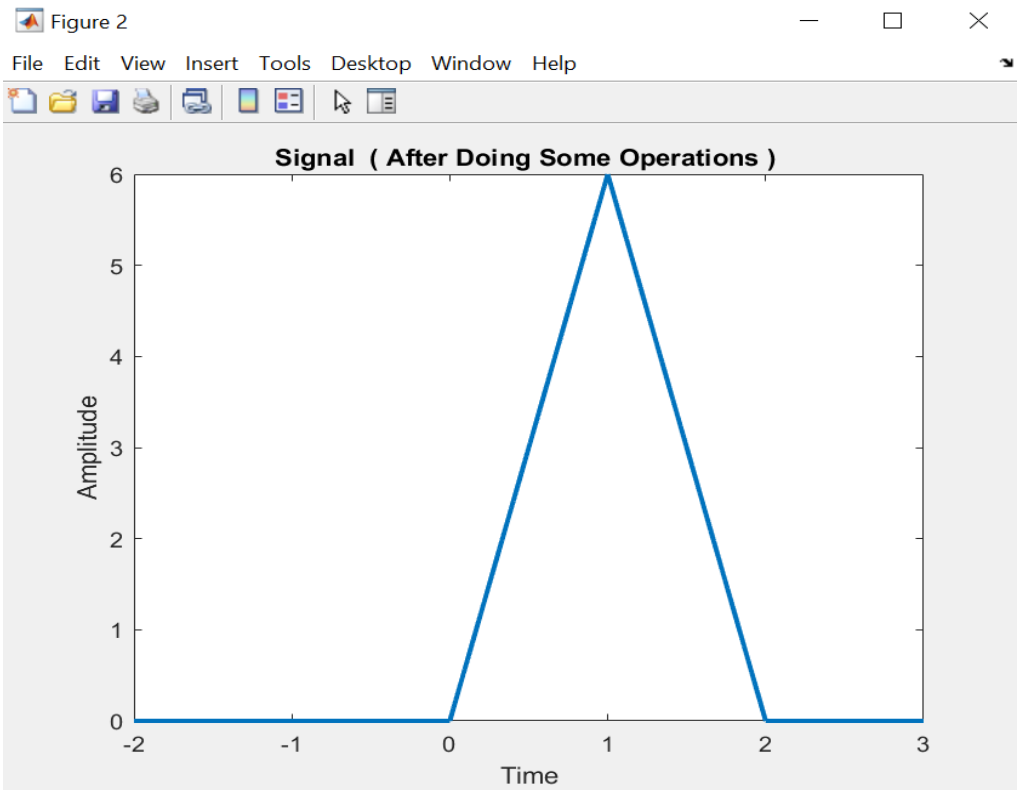


Figure 12.8

13.(Assumption 13)

a) Primary Parameters :

```
Command Window
************* Welcome To General Signal Generator *************
---------------------------------
Enter the Sampling Frequency ( Fs ) : 1000
---------------------------------
Enter the Start of Time Scale : -4
---------------------------------
Enter the End of Time Scale : 4
---------------------------------
Enter Number of the Break points : 5
---------------------------------
Enter the Positions of the Break points : [ -2 0 1 2 3 ]
---------------------------------
```

Figure 13.1

b) Signals Specifications for each region :

```
Command Window
             ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
---------------------------------
Enter the Type of the Signal from 1 to 5 : 1
---------------------------------
Enter the Amplitude of DC Signal : 1
---------------------------------------------------------------------
```

Figure 13.2

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
---------------------------------
Enter the Type of the Signal from 1 to 5 : 2
---------------------------------
Enter the Slope of Ramp Signal : 0.5
---------------------------------
Enter the intercept of Ramp Signal : 2
---------------------------------------------------------------------
```

Figure 13.3

```
Command Window
             ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
---------------------------------
Enter the Type of the Signal from 1 to 5 : 5
---------------------------------
Enter the Amplitude of Sinusoidal Signal : 1
---------------------------------
Enter the Frequency of Sinusoidal Signal  : 0.25
---------------------------------
Enter the Phase Shift of Sinusoidal Signal : pi/2
---------------------------------
Enter the Y Shift of Sinusoidal Signal ( DC Offset ): 1
---------------------------------------------------------------------
```

Figure 13.4

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 1
----------------------------------
Enter the Amplitude of DC Signal : 1
-----------------------------------------------------------------------
```

Figure 13.5

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 2
----------------------------------
Enter the Slope of Ramp Signal : 1
----------------------------------
Enter the intercept of Ramp Signal : -1
-----------------------------------------------------------------------
```

Figure 13.6

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 1
----------------------------------
Enter the Amplitude of DC Signal : 0
-----------------------------------------------------------------------
```

Figure 13.7

c) Display the resulting Signal in Time Domain :

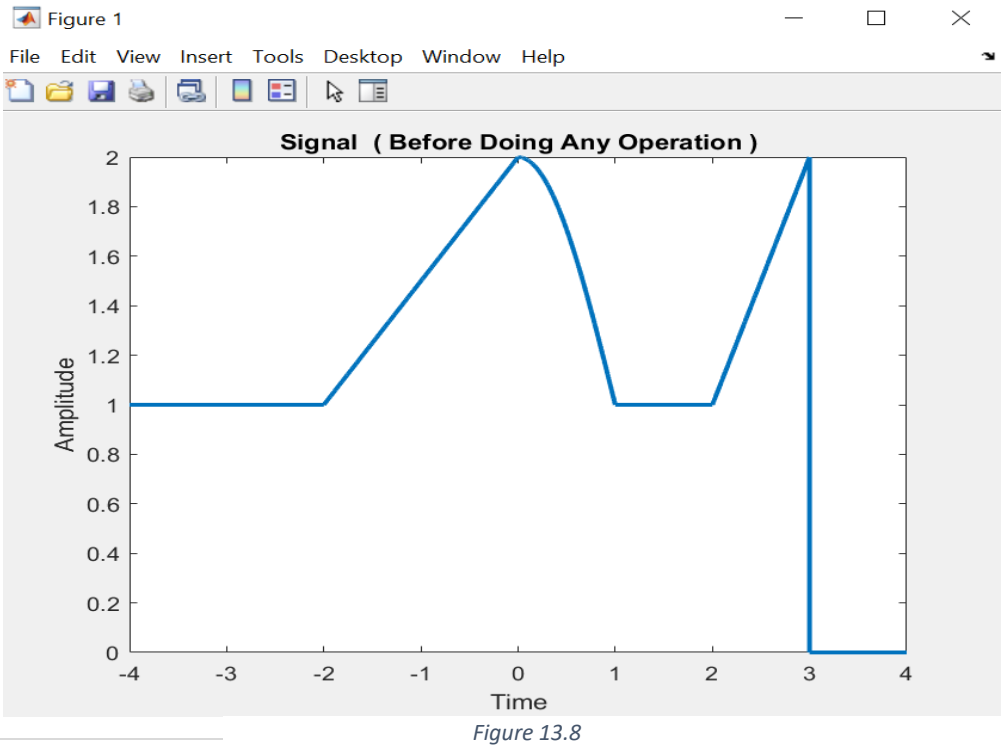


Figure 13.8

d) Required operations to be performed on the Signal :

```
Command Window

              ******** Available Operations ********
-----------------------------------
1- Amplitude Scaling
2- Time Reversal
3- Time Shift
4- Expanding the Signal
5- Compressing the Signal
6- NONE
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 3
-----------------------------------
Enter the Shift Value (+ve) for Shift Right (-ve) for Shift Left : -4
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 2
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 5
-----------------------------------
Enter the Compressing Value : 2
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 6
-----------------------------------
*************************** Thank You ****************************
```

Figure 13.9

e) Display the new modified Signal in Time Domain :

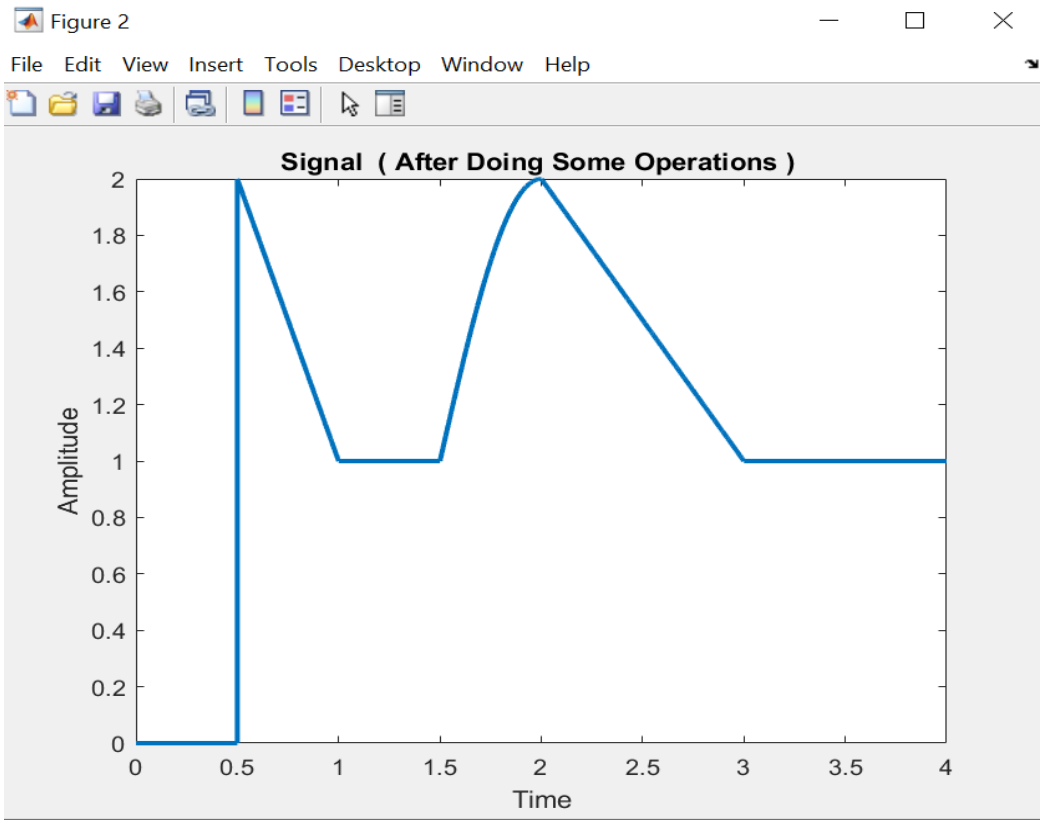


Figure 13.10

14.(Assumption 14)

a) Primary Parameters :

```
Command Window
************* Welcome To General Signal Generator *************
----------------------------------
Enter the Sampling Frequency ( Fs ) : 1000
----------------------------------
Enter the Start of Time Scale : -4
----------------------------------
Enter the End of Time Scale : 7
----------------------------------
Enter Number of the Break points : 5
----------------------------------
Enter the Positions of the Break points : [ -3 -2 2 4 5 ]
----------------------------------
```

Figure 14.1

b) Signals Specifications for each region :

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 1
----------------------------------
Enter the Amplitude of DC Signal : 0
--------------------------------------------------------------------
```

Figure 14.2

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 2
----------------------------------
Enter the Slope of Ramp Signal : 1
----------------------------------
Enter the intercept of Ramp Signal : 3
--------------------------------------------------------------------
```

Figure 14.3

```
Command Window
              ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 1
----------------------------------
Enter the Amplitude of DC Signal : 1
--------------------------------------------------------------------
```

Figure 14.4

```
Command Window

             ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 2
----------------------------------
Enter the Slope of Ramp Signal : -0.5
----------------------------------
Enter the intercept of Ramp Signal : 2
--------------------------------------------------------------------
```

Figure 14.5

```
Command Window

             ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 1
----------------------------------
Enter the Amplitude of DC Signal : -1
--------------------------------------------------------------------
```

Figure 14.6

```
Command Window

             ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 1
----------------------------------
Enter the Amplitude of DC Signal : 2
--------------------------------------------------------------------
```

Figure 14.7

c) Display the resulting Signal in Time Domain :

Figure 14.8

d) Required operations to be performed on the Signal :

```
Command Window
              ******** Available Operations ********
-----------------------------------
1- Amplitude Scaling
2- Time Reversal
3- Time Shift
4- Expanding the Signal
5- Compressing the Signal
6- NONE
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 1
-----------------------------------
Enter the Amplitude Scaling Value : 2
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 3
-----------------------------------
Enter the Shift Value (+ve) for Shift Right (-ve) for Shift Left : 2
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 4
-----------------------------------
Enter the Expanding Value : 2
-----------------------------------
Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 6
-----------------------------------
************************** Thank You ****************************
```

Figure 14.9

e) Display the new modified Signal in Time Domain :

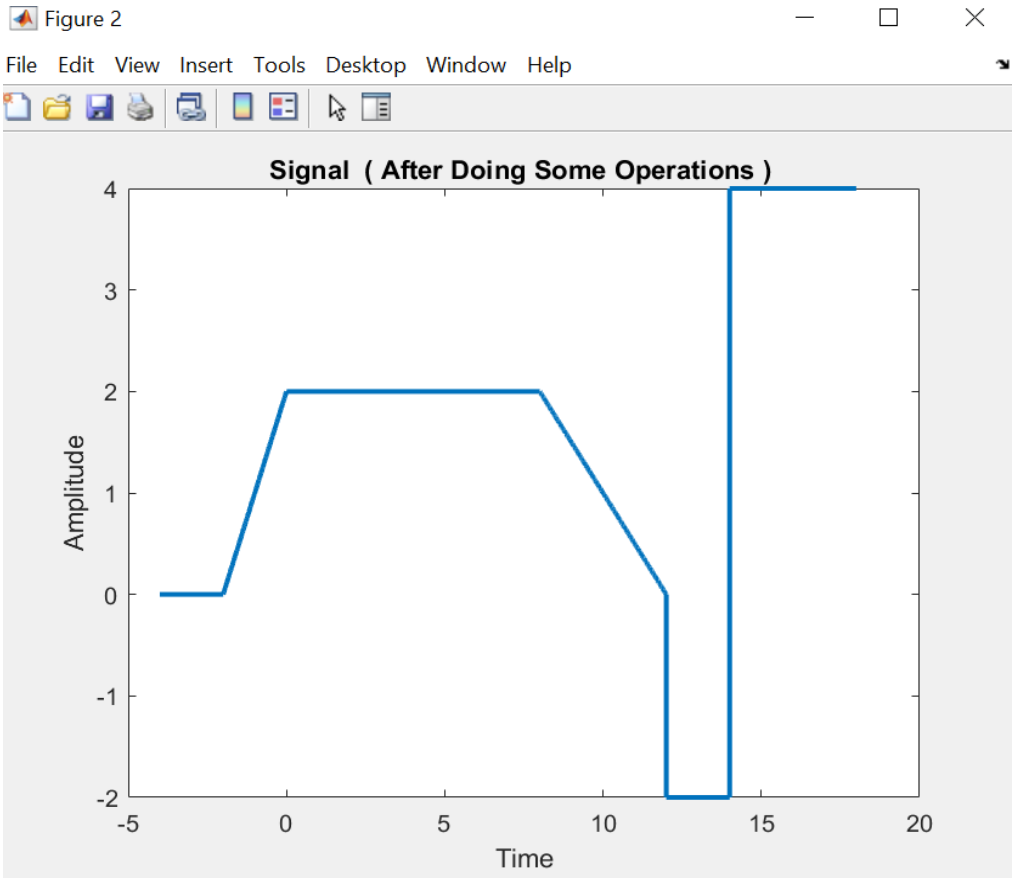


Figure 14.10

15.(Assumption 15)

a) Primary Parameters :

```
Command Window
************* Welcome To General Signal Generator *************
---------------------------------
Enter the Sampling Frequency ( Fs ) : 1000
---------------------------------
Enter the Start of Time Scale : -2
---------------------------------
Enter the End of Time Scale : 2
---------------------------------
Enter Number of the Break points : 3
---------------------------------
Enter the Positions of the Break points : [ -1 0 1 ]
---------------------------------
```

Figure 15.1

b) Signals Specifications for each region :

```
Command Window
             ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
---------------------------------
Enter the Type of the Signal from 1 to 5 : 1
---------------------------------
Enter the Amplitude of DC Signal : -2
--------------------------------------------------------------------
```

Figure 15.2

```
Command Window
             ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
---------------------------------
Enter the Type of the Signal from 1 to 5 : 2
---------------------------------
Enter the Slope of Ramp Signal : 2
---------------------------------
Enter the intercept of Ramp Signal : 2
--------------------------------------------------------------------
```

Figure 15.3

```
Command Window
             ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
---------------------------------
Enter the Type of the Signal from 1 to 5 : 2
---------------------------------
Enter the Slope of Ramp Signal : 2
---------------------------------
Enter the intercept of Ramp Signal : -2
--------------------------------------------------------------------
```

Figure 15.4

```
Command Window

            ******** Available Signals ********
1- DC Signal
2- Ramp Signal
3- General Order Polynomial
4- Exponential Signal
5- Sinusoidal Signal
----------------------------------
Enter the Type of the Signal from 1 to 5 : 1
----------------------------------
Enter the Amplitude of DC Signal : 2
--------------------------------------------------------------------
```

Figure 15.5

c) Display the resulting Signal in Time Domain :

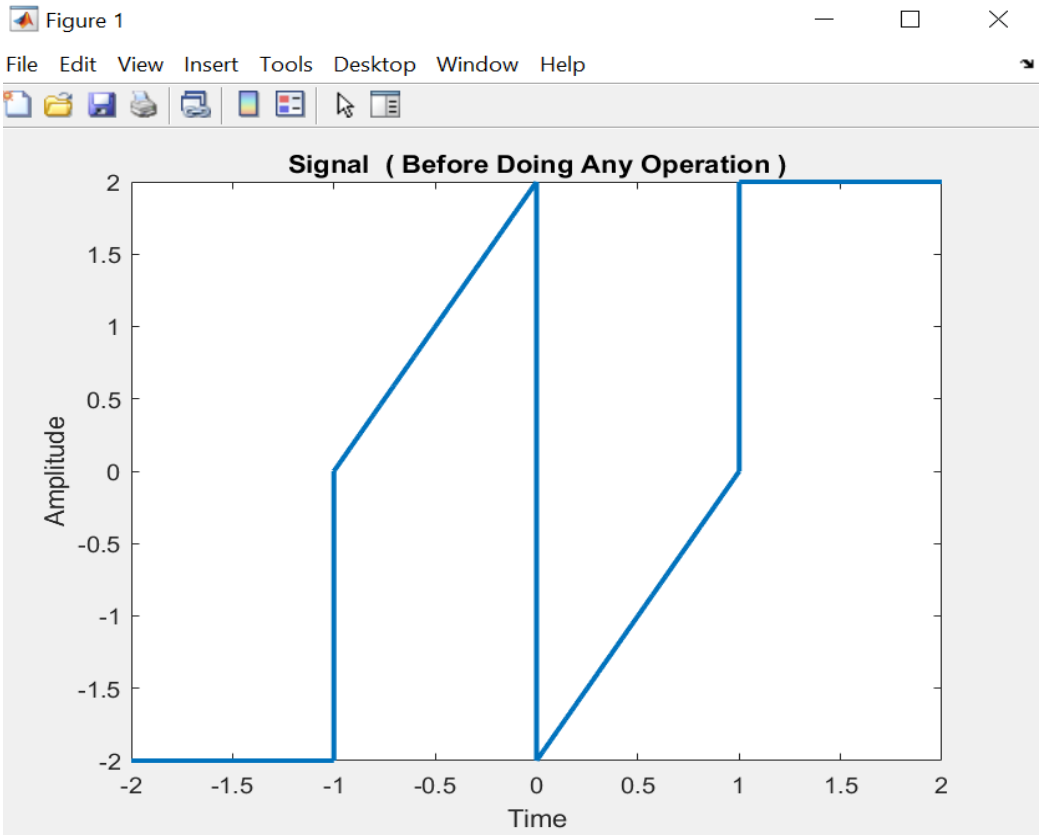


Figure 15.6

d) Required operations to be performed on the Signal :

```
Command Window
              ******** Available Operations ********
  ------------------------------------
  1- Amplitude Scaling
  2- Time Reversal
  3- Time Shift
  4- Expanding the Signal
  5- Compressing the Signal
  6- NONE
  ------------------------------------
  Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 1
  ------------------------------------
  Enter the Amplitude Scaling Value : 3
  ------------------------------------
  Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 3
  ------------------------------------
  Enter the Shift Value (+ve) for Shift Right (-ve) for Shift Left : -2
  ------------------------------------
  Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 2
  ------------------------------------
  Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 5
  ------------------------------------
  Enter the Compressing Value : 2
  ------------------------------------
  Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified Signal : 6
fx ------------------------------------
```

Figure 15.7

e) Display the new modified Signal in Time Domain :

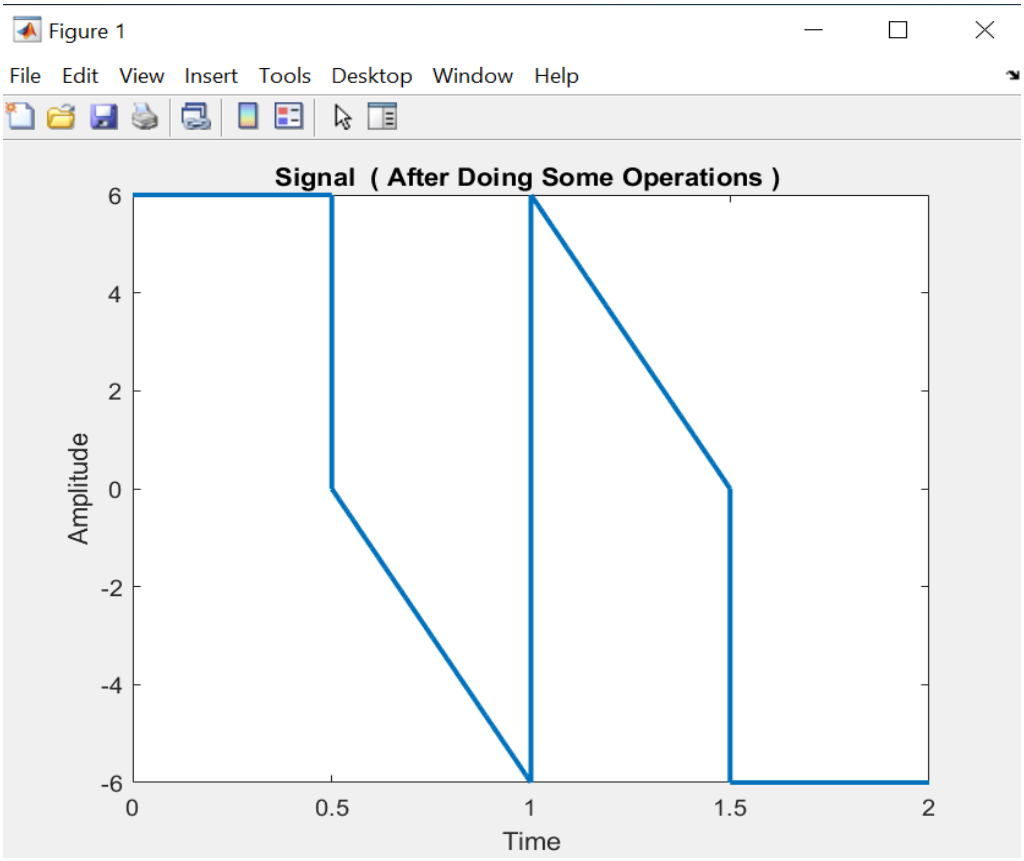
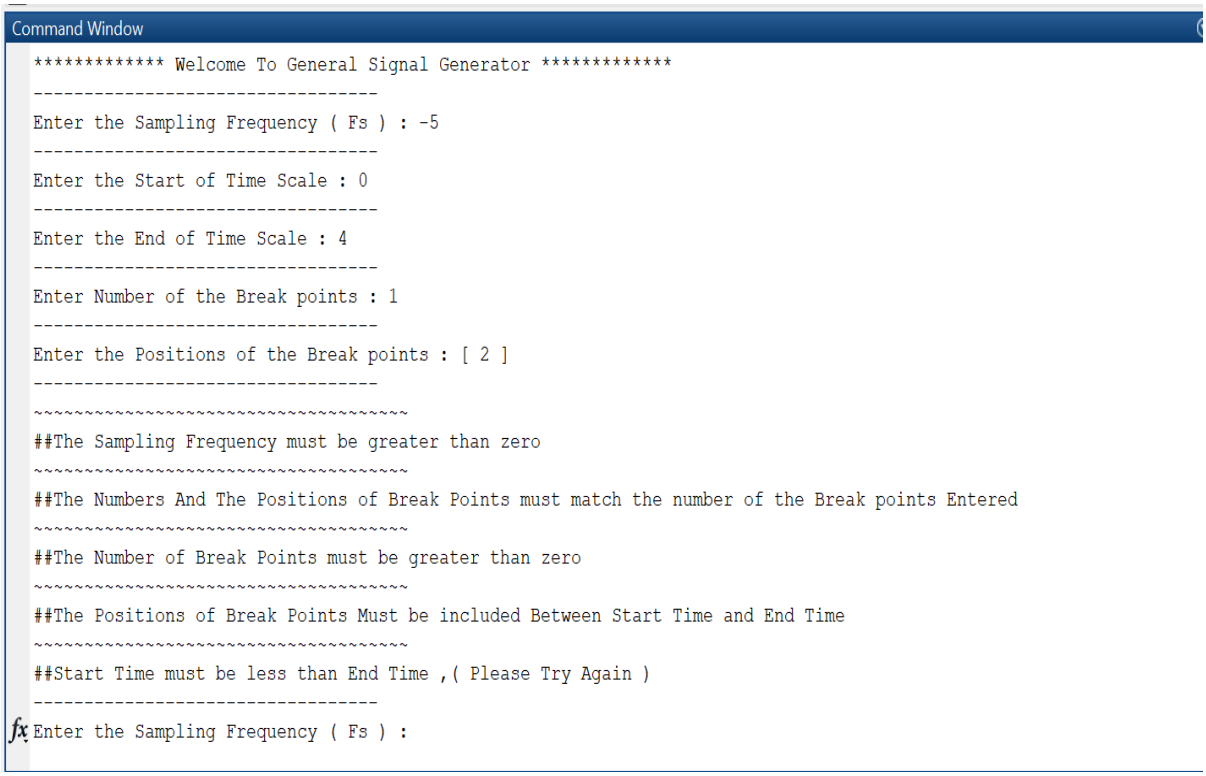


Figure 15.8

Validations and Interrupt Handlings :

- There have been implemented many validations in the program in order to make the program mare stable more accurate with no errors , bugs and no warnings , all of the possible errors and un logical inputs have been taken into considerations while implementing and coding the program , which are described as follows :
  - The Sampling Frequency (Fs) must be greater than zero .
  - The Numbers and The Positions of break points must match the numbers of break points entered .
  - The Number of break points entered must be greater than zero .
  - The Positions of break points must be included between Start time and End time of time scale .
  - Start time must be less than End time .

- All the validations can be shown and tried in the below figures :
  - The Sampling Frequency (Fs) must be greater than zero.



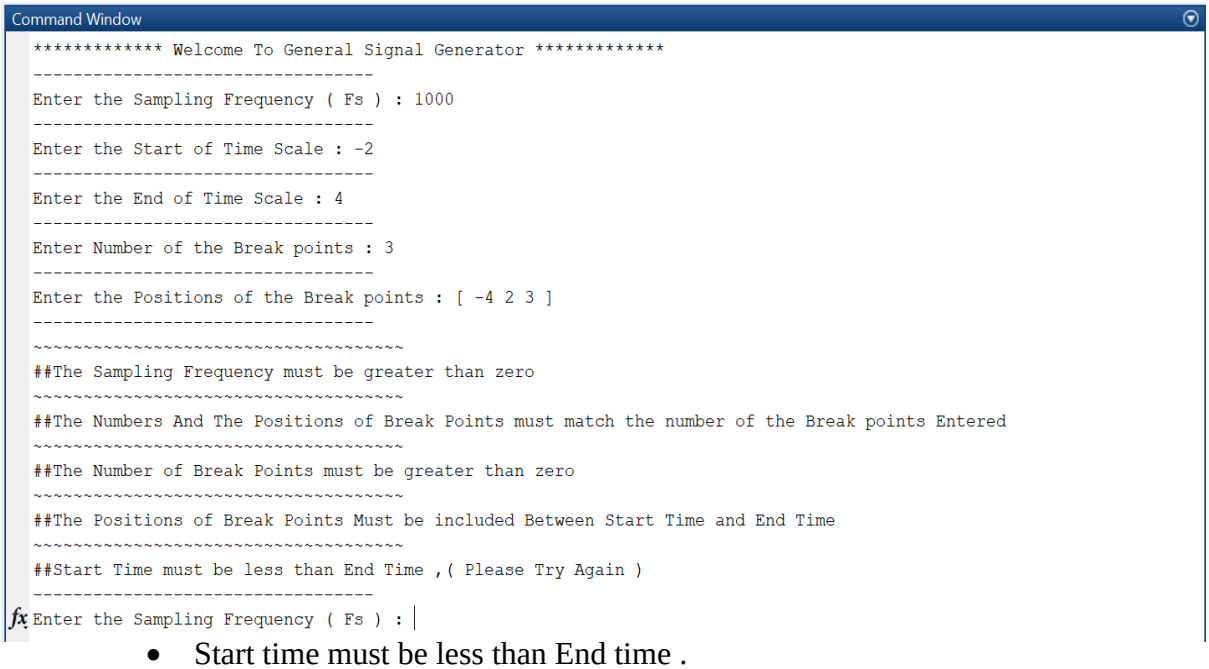
- The Numbers and The Positions of break points must match the numbers of break points entered .

```
Command Window
************* Welcome To General Signal Generator *************
---------------------------------
Enter the Sampling Frequency ( Fs ) : 1000
---------------------------------
Enter the Start of Time Scale : -1
---------------------------------
Enter the End of Time Scale : 4
---------------------------------
Enter Number of the Break points : 2
---------------------------------
Enter the Positions of the Break points : [1]
---------------------------------
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
##The Sampling Frequency must be greater than zero
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
##The Numbers And The Positions of Break Points must match the number of the Break points Entered
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
##The Number of Break Points must be greater than zero
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
##The Positions of Break Points Must be included Between Start Time and End Time
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
##Start Time must be less than End Time ,( Please Try Again )
---------------------------------
fx Enter the Sampling Frequency ( Fs ) :
```

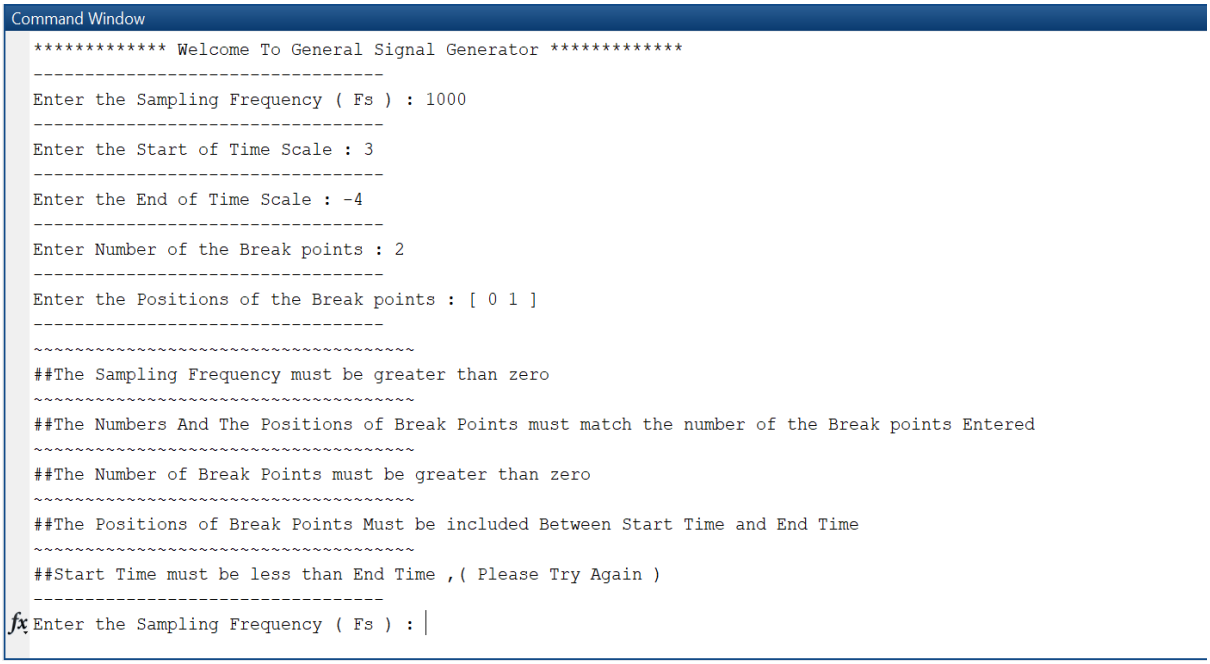
- The Number of break points entered must be greater than zero .

```
Command Window
************* Welcome To General Signal Generator *************
---------------------------------
Enter the Sampling Frequency ( Fs ) : 1000
---------------------------------
Enter the Start of Time Scale : 0
---------------------------------
Enter the End of Time Scale : 3
---------------------------------
Enter Number of the Break points : -1
---------------------------------
Enter the Positions of the Break points : [ 0 2 ]
---------------------------------
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
##The Sampling Frequency must be greater than zero
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
##The Numbers And The Positions of Break Points must match the number of the Break points Entered
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
##The Number of Break Points must be greater than zero
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
##The Positions of Break Points Must be included Between Start Time and End Time
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
##Start Time must be less than End Time ,( Please Try Again )
---------------------------------
fx Enter the Sampling Frequency ( Fs ) :
```

- The Positions of break points must be included between Start time and End time of time scale .



- Start time must be less than End time .



- From the above figures , it can be concluded that , even if the user has entered any un logical or unsuitable input , the program will give him a clarification messages , then will ask the user to try again and re enter valid inputs in order to generate and plot the required signal correctly .
- Also there are more validation has already implemented in the code while using (switch statement) even if the user has entered invalid or un existed choice from the menus of both (Signal Specifications or Required Operations) , the program also will give the user a clarification message and ask the user to try again and re enter valid choices .

User Manual :

- In this section (User Manual) , there are some tips and guidelines to the user , in order to enjoy running the program and plotting the required signal with an entertainment way , these tips and guidelines can be described as follows :
  - The user should read the validation rules carefully **(as described previously)** in order to run the program smoothly .
  - The user should avoid entering un logical inputs or any un valid choices , because the program will ask him again to re enter valid inputs and choices (should be careful to make the run time more easy) .
  - While entering the positions of Break points , make sure to use the square brackets and to include the break points positions inside the square brackets , as the breaking points positions must be a vector **(VERY IMPORTANT)** .
  - The user can plot and generate any type of signals , in terms of he must determine and calculate the input data correctly such as (frequency , amplitude , shift value ,….etc) .
  - The user should read the messages appears to him carefully while entering the inputs such as while doing the time shifting operation the appeared message asks him to enter (positive value) for shift right and (negative value) for shift left **(VERY IMPORTANT) .**
  - Finally in order to enjoy running the Program , the user should read the above points carefully and enjoy plotting the desired signals and doing operations on them .

Conclusion :

In this part of Final Project (Part 2) , it is required to write a program to implement a General Signal Generator that interfaces directly with user , takes some parameters from user , ask about the specification of the signal for each region in the time limit whether the signal existed in a specific region , display the resulted signal in time domain , ask the user about the desired operations to be implemented on the signal , ask the user if there are no desired operations to be implemented and finally the program should display the new modified signal in time domain , after implementing and coding the program it is required to make at least 10 assumptions for generating different signals with different time limits , breaking points and signal specifications , covering all the program options , there are added more 5 assumptions , in order to be the total numbers of assumptions made is 15 assumptions , the program have been implemented and written using **MATLAB** software correctly with all the program specifications and requirements , also all the validations and interrupt handlings have been taken into consideration and all of them have been implemented , also the user manual have been attached in this PDF report , also the Source Code (.m File) have been uploaded to a google drive , with the link attached below , also the Source Code (.m File) itself have been attached below with all the implemented code .

Source Code (.m File) Link

Link :

https://drive.google.com/file/d/1IKvDG3z1E_c4gN8Oa7sZlcUCCV00ShHj/view?usp=sharing

Source Code (.m File)

```
close all;clear;clc;
disp('************** Welcome To General Signal Generator **************');
fprintf('-----------------------------------\n');
Fs=input('Enter the Sampling Frequency ( Fs ) : ');
fprintf('-----------------------------------\n');
startTime=input('Enter the Start of Time Scale : ');
fprintf('-----------------------------------\n');
EndTime=input('Enter the End of Time Scale : ');
fprintf('-----------------------------------\n');
breakPoints=input('Enter Number of the Break points : ');
fprintf('-----------------------------------\n');
ss=input('Enter the Positions of the Break points : ');
fprintf('-----------------------------------\n');
s1=1;
ys=[];
ts=[];

while (Fs<=0)||((breakPoints ~= numel(ss))||(breakPoints<=0)) || (ss(1)<= startTime)  || (ss(1) >=
EndTime)||(startTime>EndTime)||(ss(end)<= startTime)||(ss(end) >= EndTime)
   fprintf('~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~\n');
   disp('##The Sampling Frequency must be greater than zero ');
   fprintf('~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~\n');
   disp('##The Numbers And The Positions of Break Points must match the number of the Break points
Entered');
   fprintf('~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~\n');
   disp('##The Number of Break Points must be greater than zero ');
   fprintf('~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~\n');
   disp('##The Positions of Break Points Must be included Between Start Time and End Time ');
   fprintf('~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~\n');
   disp('##Start Time must be less than End Time ,( Please Try Again )');
   fprintf('-----------------------------------\n');
   Fs=input('Enter the Sampling Frequency ( Fs ) : ');
   fprintf('-----------------------------------\n');
   startTime=input('Enter the Start of Time Scale : ');
   fprintf('-----------------------------------\n');
   EndTime=input('Enter the End of Time Scale : ');
   fprintf('-----------------------------------\n');
   breakPoints=input('Enter Number of the Break points : ');
   fprintf('-----------------------------------\n');
   ss=input('Enter the Positions of the Break points : ');
end
sp=[startTime];
fo=1;
for q=ss
   sp(fo+1)=q;
   fo=fo+1;
end
ss(end+1)=EndTime;
R=0;
while R<breakPoints+1
   disp('-------------------------------------------------------------------');
   disp('              ******** Available Signals ********');
   fprintf('1- DC Signal \n2- Ramp Signal \n3- General Order Polynomial \n4- Exponential Signal \n5-
Sinusoidal Signal\n');
   fprintf('-----------------------------------\n');
   x=input('Enter the Type of the Signal from 1 to 5 : ');
```

```
switch x

    case 1
    endpoint=ss(s1);
    startpoint=sp(s1);
    fprintf('---------------------------------\n');
    DC=input('Enter the Amplitude of DC Signal : ');
    b=[startpoint:endpoint]*0;
    y=b+DC;
    T=[startpoint:endpoint];
    case 2
    endpoint=ss(s1);
    startpoint=sp(s1);
    fprintf('---------------------------------\n');
    slope=input('Enter the Slope of Ramp Signal : ');
    fprintf('---------------------------------\n');
    inter=input('Enter the intercept of Ramp Signal : ');
    time=linspace(startpoint,endpoint,(endpoint-startpoint).*Fs);
%       T=time(time>0);
    T=time;
    y=(slope.*T)+inter;
    case 3
    endpoint=ss(s1);
    startpoint=sp(s1);
    fprintf('---------------------------------\n');
    amp=input('Enter the Amplitude of General Order Polynomial : ');
    fprintf('---------------------------------\n');
    power=input('Enter the Power of General Order Polynomial : ');
    fprintf('---------------------------------\n');
    inter1=input('Enter the intercept of General Order Polynomial : ');
    T=linspace(startpoint,endpoint,(endpoint-startpoint).*Fs);
    y=0;
    for i = power:-1:1
       coeff=input('Enter the Coefficient : ');
       y=y+(coeff*T.^i);
    end
    y= amp*(y+inter1);
    case 4
    endpoint=ss(s1);
    startpoint=sp(s1);
    fprintf('---------------------------------\n');
    amp=input('Enter the Amplitude of Exponential Signal : ');
    fprintf('---------------------------------\n');
    exp1=input('Enter the Exponent of Exponential Signal : ');
    T=linspace(startpoint,endpoint,(endpoint-startpoint).*Fs);
    y=amp.*exp(exp1.*T);
    case 5
    endpoint=ss(s1);
    startpoint=sp(s1);
    T=linspace(startpoint,endpoint,(endpoint-startpoint).*Fs);
    fprintf('---------------------------------\n');
    amp=input('Enter the Amplitude of Sinusoidal Signal : ');
    fprintf('---------------------------------\n');
    freq=input('Enter the Frequency of Sinusoidal Signal  : ');
    fprintf('---------------------------------\n');
    phaseShift=input('Enter the Phase Shift of Sinusoidal Signal : ');
    fprintf('---------------------------------\n');
    yShift=input('Enter the Y Shift of Sinusoidal Signal ( DC Offset ): ');
    y=amp.*sin((2*pi*freq.*T)+phaseShift)+yShift;
```

```
        otherwise
        fprintf('----------------------------------\n');
        x=input('Enter the Valid Number for Type of the Signal from 1 to 5 : ');

    end

    ys=[ys y];
    ts=[ts T];
    s1=s1+1;
    R=R+1;
end
figure ;
plot(ts,ys,'LineWidth',2);
title('Signal  ( Before Doing Any Operation ) ');
xlabel('Time');
ylabel('Amplitude');
disp('------------------------------------------------------------------');
disp('              ******** Available Operations ********');
fprintf('----------------------------------\n');
fprintf('1- Amplitude Scaling\n2- Time Reversal\n3- Time Shift\n4- Expanding the Signal\n5- Compressing the
Signal\n6- NONE\n');
regraph=0;
while regraph ~= 6
    fprintf('----------------------------------\n');
    regraph=input('Enter the Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot the Modified
Signal : ');
    switch regraph
        case 1
        fprintf('----------------------------------\n');
        amp=input('Enter the Amplitude Scaling Value : ');
        ys= amp.*ys;
        case 2
        ts=ts.*-1;
        case 3
        fprintf('----------------------------------\n');
        shiftvalue=input('Enter the Shift Value (+ve) for Shift Right (-ve) for Shift Left : ');
        ts=ts+shiftvalue;
        case 4
        fprintf('----------------------------------\n');
        expanding=input('Enter the Expanding Value : ');
        ts=(ts.*expanding);
        case 5
        fprintf('----------------------------------\n');
        compresing=input('Enter the Compressing Value : ');
        ts=(ts./compresing);
        case 6
        fprintf('----------------------------------\n');
        disp('***************************** Thank You ******************************');
        otherwise
        fprintf('----------------------------------\n');
        regraph=input('Enter the Valid Number of Required Operation from ( 1 to 5 ) or Enter ( 6 ) to Stop and Plot
the Modified Signal : ');
    end
end
figure;
plot(ts,ys,'LineWidth',2);
title('Signal  ( After Doing Some Operations ) ');
xlabel('Time');
ylabel('Amplitude');
```