Scilab Manual for
Basic Simulation Laboratory
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[1]

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January 30, 2023

[1]Funded by a grant from the National Mission on Education through ICT, http://spoken-tutorial.org/NMEICT-Intro. This Scilab Manual and Scilab codes written in it can be downloaded from the "Migrated Labs" section at the website http://scilab.in

Contents

List of Experiments

List of Figures

Experiment: 1

Basic operation on matrices

Scilab code Solution 1.1 Basic operations on matrices

```
1 //Experiment Number:1
2 //Write a program to perform basic operation on
     matrices
3 //Basic Simulation Laboratory
4 //B.Tech II Year I Sem
5 //Studdent Name:                Enrolement Number:
6 // Course Instructor: Dr.Kantipudi MVV Prasad,
7 // Sreyas Institute Of Engineering & Technlogy,
     Hyderabad.
8 //
   ----------------------------------------------------------------------------
9
10
11 // OS : Windows 10.1
12 // Scilab 6.0.2
13
14
15 clc;
16 close
17 clear ;
```

```
18
19 //  Enter Matrices from Keyboard
20
21 A = input('Enter the Matrix A :');
22 B = input('Enter the Matrix B :');
23
24 // Display the Entered Matrices from Keyboard
25
26 disp(A,'The Matrix A is .... :');
27
28 disp(B,'The Matrix B is .... :');
29
30 // Find the size of matrices
31
32 disp('The size of Matrix A is .... : ');
33
34 disp(size(A));
35
36 disp('The size of Matrix B is .... : ');
37
38 disp(size(B));
39
40 // Addition of two matrices
41
42 disp('Addition of A and B Matrices is .....: ');
43
44 disp(A + B);
45
46 // Subtration of two matrices
47
48 disp('Subtraction of A and B Matrices is .....: ');
49
50 disp(A - B);
51
52 //Multiplication by a scalar
53 disp('Multiplication of matrix A with a scalar value
       K  .....: ');
54
```

```
55 K = input('Enter a scalar value K  :');
56
57 disp(K*A);
58
59 //Multiplication of two matrices
60
61 disp('Multiplication of A and B Matrices is .....: '
      );
62
63 disp(A * B);
64
65
66 //Multiplication (Element by Element) of two
      matrices
67
68 disp('Multiplication (Element by Element) of A and B
       Matrices is .....: ');
69
70 disp(A .* B);
71
72 // Finding the Rank of the matrix
73
74 disp('Rank of Matrix A is :');
75
76 disp(rank(A));
77
78 // Find the determinant of the matrix
79
80 disp('Determinant of Matrix A is :');
81
82 disp(det(A));
83
84 // Find the trace of the matrix
85
86 disp('Trace of Matrix A is :');
87
88 disp(trace(A));
89
```

```
90 //Find the Inverse of the matrix
91
92 disp('Inverse of Matrix A is :');
93
94 disp(inv(A));
```

Experiment: 2

Generation of Various Signals & Sequences (Periodic/Aperiodic), such as Unit Impulse, Unit Step, Square, Sawtooth, Triangular

Scilab code Solution 2.1 Generation Of Unit Impulse and Unit Step Signal and Sequences

```
1 //Experiment Number:2.1
2 //Write a program to generate unit impulse and unit
     step Signals and Sequences
3 //Basic Simulation Laboratory
4 //B.Tech II Year I Sem
5 //Studdent Name:                    Enrolement Number:
6 // Course Instructor: Dr.Kantipudi MVV Prasad,
7 // Sreyas Institute Of Engineering & Technlogy,
     Hyderabad.
8 //
```

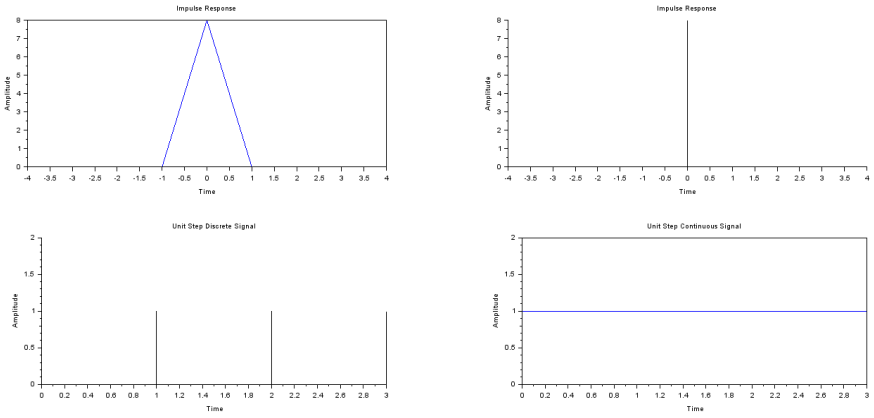

Figure 2.1: Generation Of Unit Impulse and Unit Step Signal and Sequences

```
9
10 // OS : Windows 10.1
11 // Scilab 6.0.2
12
13
14 clc;
15 close
16 clear ;
17
18 // Unit Impulse Signal and Sequence
19
20 t=-4:1:4;
21 a=[zeros(1,4) 1 zeros(1,4)];
22 k=input("Enter the Amplitude : "); // reading
      amplitude value from keyboard
23 b=k*a;
24
25 subplot(2,2,1);
26 plot(t,b);
27 xlabel("Time");
28 ylabel("Amplitude");
```

```
29 title("Impulse Response");
30
31 subplot(2,2,2);
32 plot2d3(t,b);
33 xlabel("Time");
34 ylabel("Amplitude");
35 title("Impulse Response");
36
37 // Unit Step Signal and Sequence:
38
39 // Discrete Signal
40
41 t=0:3;
42 y=ones(1,4);
43
44 subplot(2,2,3);
45 plot2d3 (t,y);
46 xlabel('Time');
47 ylabel('Amplitude');
48 title('Unit Step Discrete Signal');
49
50 // Continuous Signal
51
52 subplot(2,2,4);
53 plot(t,y);
54 xlabel('Time');
55 ylabel('Amplitude');
56 title('Unit Step Continuous Signal');
57
58 // Enter the Amplitude : 8
```

Scilab code Solution 2.2 Generation Of Square Wave and Sawtooth Wave Signals and Sequences

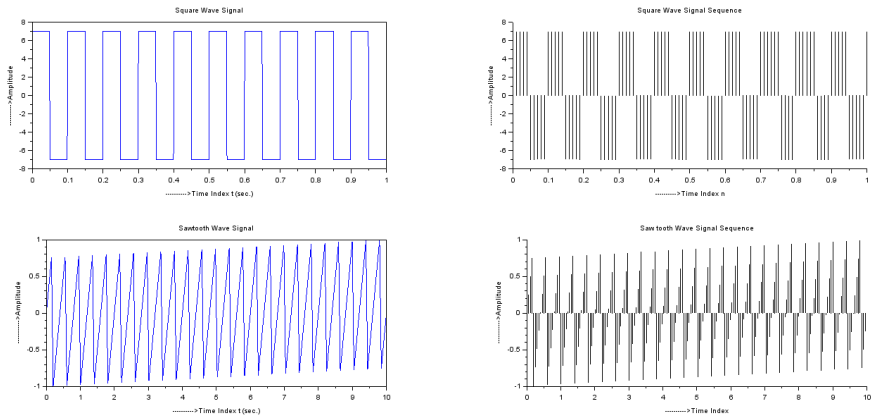

Figure 2.2: Generation Of Square Wave and Sawtooth Wave Signals and Sequences

```
1  //Experiment Number:2.2
2  //Write a program to generate square wave and
       sawtooth wave Signals and Sequences
3  //Basic Simulation Laboratory
4  //B.Tech II Year I Sem
5  //Studdent Name:                    Enrolement Number:
6  // Course Instructor: Dr.Kantipudi MVV Prasad,
7  // Sreyas Institute Of Engineering & Technlogy,
       Hyderabad.
8  //
   ------------------------------------------------------------------------------
9
10 // OS : Windows 10.1
11 // Scilab 6.0.2
12
13
14 clc;
15 close;
16 clear ;
17
18
```

```
// continuous square wave Signal:

a=input('Enter Amplitude : ');
t=0:0.001:1;
d=a*squarewave(2*%pi*10*t);

subplot(2,2,1);
plot(t,d);
xlabel ("------------>Time Index t (sec.)");
ylabel ("------------>Amplitude");
title (" Square Wave Signal ");

// discrete square wave signal

//a=input('Enter amplitude');
n=0 : 0.01 :1;
d=a*squarewave(2*%pi*10*n);

subplot(2,2,2);
plot2d3(n,d);
xlabel ("------------>Time Index n");
ylabel ("------------>Amplitude");
title ("Square Wave Signal Sequence");

// Sawtooth Wave Signal

Fs = 20; // samples per second
t_total = 10; // seconds
n_samples = Fs * t_total;
t = linspace(0, t_total, n_samples);
f=500; // sound frequency

saw_wave=2*(f*t-floor(0.5+f*t));

subplot(2,2,3);
plot(t,saw_wave);
xlabel ("------------>Time Index t (sec.)");
ylabel ("------------>Amplitude");
```

```
57 title (" Sawtooth Wave Signal ");
58
59 // sawtooth wave sequence
60
61 Fs = 20; // samples per second
62 t_total = 10; // seconds
63 n_samples = Fs * t_total;
64 n = linspace(0, t_total, n_samples);
65 f=500; // sound frequency
66
67 saw_wave=2*(f*n-floor(0.5+f*n));
68
69 subplot(2,2,4);
70
71 plot2d3(n,saw_wave);
72 xlabel ("------------>Time Index ");
73 ylabel ("------------>Amplitude");
74 title ("Saw tooth Wave Signal Sequence");
75
76
77 // Input Parameters
78 //  Enter Amplitude : 7
```

Scilab code Solution 2.3 Generation Of Triangular and Sinusoidal Signal and Sequences

```
1 //Experiment Number:2.3
2 //Write a program to generate Triangular and
     Sinusoidal Signals and Sequences
3 //Basic Simulation Laboratory
4 //B.Tech II Year I Sem
5 //Studdent Name:                Enrolement Number:
6 // Course Instructor: Dr.Kantipudi MVV Prasad,
```

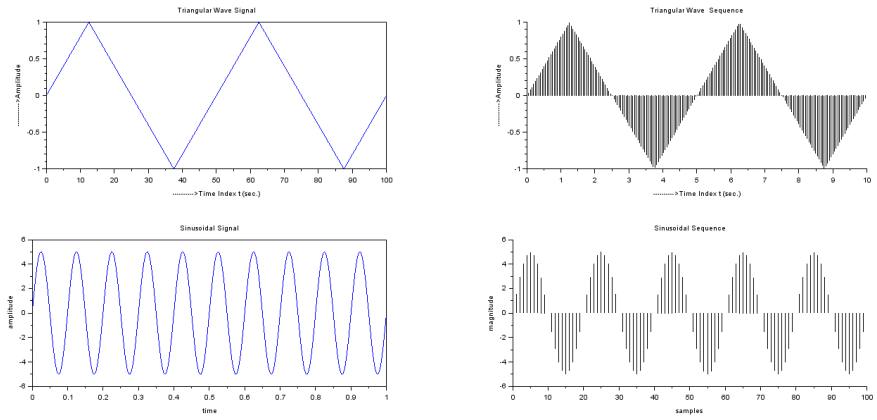

Figure 2.3: Generation Of Triangular and Sinusoidal Signal and Sequences

```
7  // Sreyas Institute Of Engineering & Technlogy,
       Hyderabad.
8  //
   ____________________________________________________________
9
10
11 // OS : Windows 10.1
12 // Scilab 6.0.2
13
14
15 clc;
16 close;
17 clear ;
18
19 // Triangular Wave Signal
20
21 Fs = 20; // samples per second
22 t_total = 100; // seconds
23 n_samples = Fs * t_total;
24 t = linspace(0, t_total, n_samples);
25 f=40; // sound frequency
26
```

```
27 tri_wave=(2/%pi)*asin(sin(2*%pi*f*t));
28
29 subplot(2,2,1);
30
31 plot(t,tri_wave);
32 xlabel ('------------>Time Index t (sec.)');
33 ylabel ('------------>Amplitude');
34 title ('Triangular Wave Signal ');
35
36 // traiangular wave sequence
37
38 Fs = 20; // samples per second
39 t_total = 10; // seconds
40 n_samples = Fs * t_total;
41 n = linspace(0, t_total, n_samples);
42 f=40; // sound frequency
43
44 tri_wave=(2/%pi)*asin(sin(2*%pi*f*n));
45
46 subplot(2,2,2);
47 plot2d3(n,tri_wave);
48 xlabel ('------------>Time Index t (sec.)');
49 ylabel ('------------>Amplitude');
50 title ('Triangular Wave  Sequence');
51
52
53 // continuous Sinusoidal Signal
54
55 a=input('Enter amplitude for Sinusoidal Signal: ');
56 t=0:0.001:1;
57 p=a*sin(2*%pi*10*t);
58
59 subplot(2,2,3);
60 plot(t,p);
61 title('Sinusoidal Signal');
62 xlabel('time');
63 ylabel('amplitude');
64
```

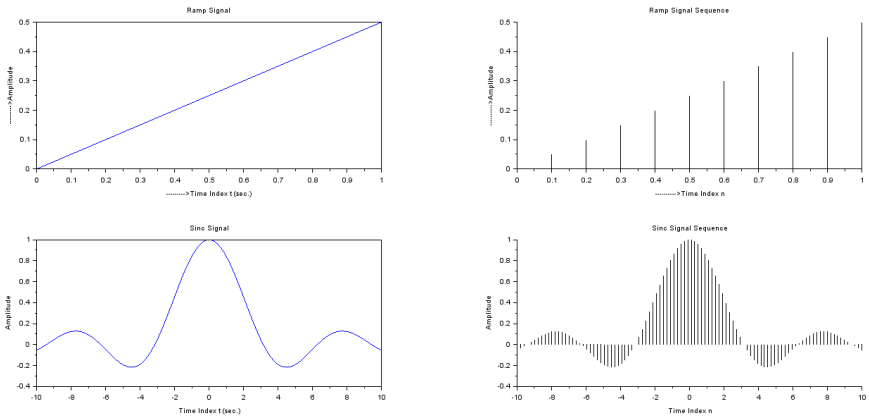

Figure 2.4: Generation Of Ramp and Sinc Signals and Sequences

```
65 // discrete sinuoidal signal
66
67 //a=input('Enter magnitude');
68 n = 0:100;
69 x =a*sin(((2*0.05)*%pi)*n);
70
71 subplot(2,2,4);
72 plot2d3(n,x);
73 title("Sinusoidal Sequence");
74 xlabel("samples");
75 ylabel("magnitude");
76
77 // After Getting Trainagular wave output ,vist the
   command window to enter Input Parameters
78 //  Enter amplitude for Sinusoidal Signal: 5
```

Scilab code Solution 2.4 Generation Of Ramp and Sinc Signals and Sequences

```
1  //Experiment Number:2.4
2  //Write a program to generate ramp and sinc Signals
     and Sequences
3  //Basic Simulation Laboratory
4  //B.Tech II Year I Sem
5  //Studdent Name:                Enrolement Number:
6  // Course Instructor: Dr.Kantipudi MVV Prasad,
7  // Sreyas Institute Of Engineering & Technlogy,
     Hyderabad.
8  //
     ------------------------------------------------------------------------


9
10 // OS : Windows 10.1
11 // Scilab 6.0.2
12
13
14 clc;
15 close
16 clear ;
17
18 //continuous ramp signal
19
20 t = 0 : 0.001 : 1;
21 y = 0.5 * t;
22
23 subplot(2,2,1);
24 plot( t , y );
25 xlabel ('---------->Time Index t (sec.)');
26 ylabel ('---------->Amplitude');
27 title ('Ramp Signal');
28
29 //discrete ramp signal
30
31 n = 0 : 0.1 : 1;
32 y = 0.5 * n;
33
34 subplot(2,2,2);
```

```
35 plot2d3(n,y);
36 xlabel ('------------>Time Index n');
37 ylabel ('------------>Amplitude');
38 title ('Ramp Signal Sequence');
39
40 //continuous sinc signal
41
42 t=linspace(-10 , 10);
43 y=sinc(t);
44
45 subplot(2,2,3);
46 plot(t,y);
47 xlabel("Time Index t (sec.)");
48 ylabel("Amplitude");
49 title("Sinc Signal ");
50
51 //discrete sinc signal
52
53 n =linspace(-10 , 10);
54 y =sinc(n);
55
56 subplot(2,2,4);
57 plot2d3(n,y);
58 xlabel("Time Index n");
59 ylabel("Amplitude");
60 title("Sinc Signal Sequence");
```

Experiment: 3

Write a program to perform operations on various Signals and Sequences

Scilab code Solution 3.1 Operations on Various Signals and Sequences

```
1 //Experiment Number: 3.1
2 //Write a program to perform Addition,Multiplication
    ,Folding,Scaling and shifting operations on
    various Signals and Sequences
3 //Basic Simulation Laboratory
4 //B.Tech II Year I Sem
5 //Studdent Name:                Enrolement Number:
6 // Course Instructor: Dr.Kantipudi MVV Prasad,
7 // Sreyas Institute Of Engineering & Technlogy,
    Hyderabad.
8 //
```

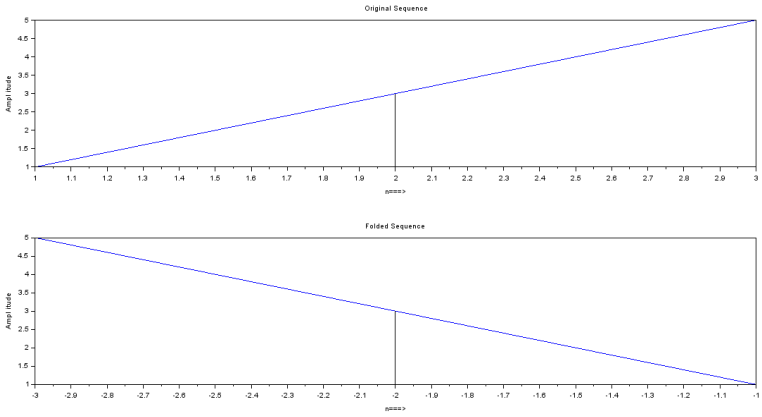

Figure 3.1: Operations on Various Signals and Sequences

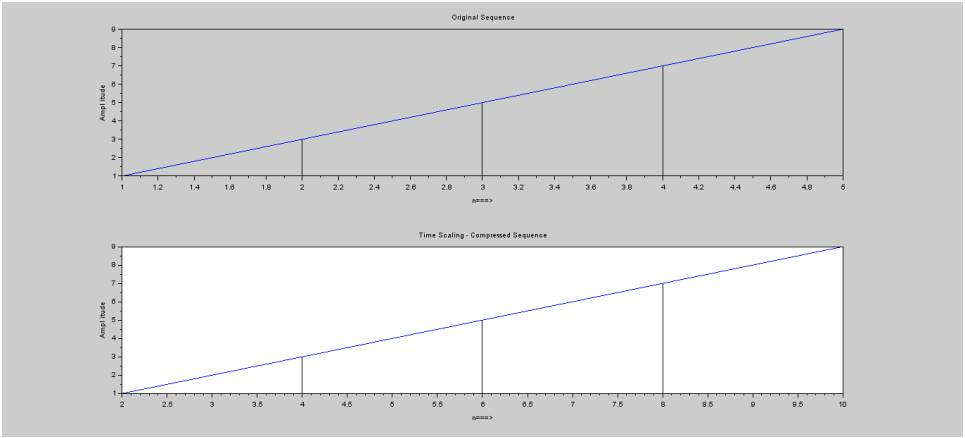

Figure 3.2: Operations on Various Signals and Sequences

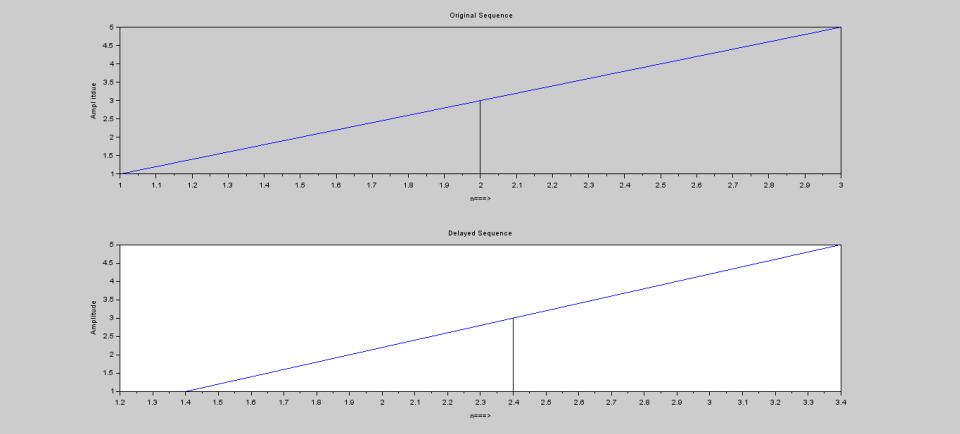

Figure 3.3: Operations on Various Signals and Sequences

```
9
10 // OS : Windows 10.1
11 // Scilab 6.0.2
12
13
14 clc;
15 close
16 clear all;
17
18
19 // Addition
20
21 disp('Enter the input sequences to perform Addition
      Operation');
22
23 x=input('Enter the sequence A=');
24 y=input('Enter the sequence B=');
25
26 m=length(x);
27 n=length(y);
28
```

```
29 if m==n then
30
31 z=x+y;
32
33 disp(z,'Addition result of two equal length
      sequences:=');
34
35 elseif m>n then
36
37 y=[y,zeros(1,m-n)];
38
39 z=x+y;
40
41 disp(z,'Addition result of two unequal length
      sequences:=');
42
43 else
44
45 x=[x,zeros(1,n-m)];
46
47 z=x+y;
48
49 disp(z,'Addition result of two unequal length
      sequences:=');
50
51 end
52
53
54 // Multiplication
55
56 disp('Enter the input sequences to perform
      muliplication Operation');
57
58 x=input('Enter the sequence A=');
59 y=input('Enter the sequence B=');
60
61 m=length(x);
62 n=length(y);
```

```
63
64 if m==n  then
65
66 z = x.*y;
67
68 disp (z, ' Multiplication result of two equal
      lengths equences:= ' );
69
70 elseif m>n then
71
72 y=[y,zeros(1,m-n)];
73
74 z = x.*y;
75
76 disp (z, ' Multiplication result of two unequal
      lengths equences:= ' );
77
78 else
79
80 x=[x,zeros(1,n-m)];
81
82 z = x.*y;
83
84 disp (z, ' Multiplication result of two unequal
      lengths equences:= ' );
85
86 end
87
88
89 // Folding Operation
90
91 disp('Enter the input sequence to perform Folding
      Operation');
92
93 x1 = input ( ' Enter the input sequence A := ' );
94 m = length (x1);
95 s = input ( ' Enter the starting point of original
      signal=' );
```

```
96  h = s + m -1;
97  n = s :1: h;
98
99  subplot (2 ,1 ,1)
100 plot(n,x1)
101 plot2d3 (n,x1)
102 xlabel ( ' n===>' )
103 ylabel ( ' Ampl itude' )
104 title ( ' Original Sequence ' )
105
106 subplot (2 ,1 ,2)
107 disp(n);
108 disp(-n);
109 plot(-n,x1)
110 plot2d3 (-n,x1)
111 xlabel ( ' n===>' )
112 ylabel ( ' Ampl itude' )
113 title ( ' Folded Sequence ' )
114
115 // Scaling Operation
116
117 disp('Enter the input sequence to perform Scaling
       Operation');
118
119 x2 = input( ' Enter input Sequence := ' );
120 m = length(x2);
121 s= input ( ' Enter starting point of originalsignal
       := ' )
122 h = s+m-1;
123 n = s :1: h;
124 C = input( 'Enter Compression Time Scaling factor: =
        ' )
125
126 n = s/C:1/C:h/C ;
127 disp(n);
128 figure;
129
130 subplot (2 ,1 ,1)
```

```
131 plot(x2)
132 plot2d3 (x2)
133 xlabel ( ' n===>' )
134 ylabel ( ' Ampl itude' )
135 title ( ' Original Sequence ' )
136
137 subplot (2 ,1 ,2)
138 plot(n,x2)
139 plot2d3 (n,x2)
140 xlabel ( ' n===>' )
141 ylabel ( ' Ampl itude' )
142 title ( ' Time Scaling - Compressed Sequence ' )
143
144 // shifting operation
145
146 disp('Enter the input sequence to perform shifting
      Operation');
147
148 x3 = input ( ' Enter the input sequence := ' )
149 m = length (x3);
150 lx = input ( ' Enter the starting point of original
      signal := ' )
151 hx = lx+m -1;
152 n = lx :1: hx;
153
154 d = input ( ' Enter the delay := ' )
155
156 figure;
157
158 subplot (2,1 ,1)
159 plot(n,x3)
160 plot2d3 (n,x3);
161 xlabel ( ' n===>' )
162 ylabel ( ' Ampl itdue' )
163 title ( ' Original Sequence' )
164
165 n = lx+d:1: hx+d;
166
```

```
167 subplot (2 ,1 ,2)
168 disp(n);
169 plot(n,x3)
170 plot2d3 (n,x3)
171 xlabel ( ' n===>' )
172 ylabel ( ' Amplitude' )
173 title ( ' Delayed Sequence ' )
174
175
176
177 // Enter the input sequences to perform Addition
      Operation
178 // Enter the sequence A= [1 3 5 7 9]
179 // Enter the sequence B= [1 3 5 ]
180 // Addition result of two unequal length sequences:=
181 //  2.   6.   10.   7.   9.
182 // Enter the input sequences to perform
      muliplication Operation
183 // Enter the sequence A= [1 3 5 7 9]
184 // Enter the sequence B= [1 3 5 ]
185 //  Multiplication result of two unequal lengths
      equences:=
186 //  1.   9.   25.   0.   0.
187
188 // Enter the input sequence to perform Folding
      Operation
189 // Enter the input sequence A :=  [1 3 5 ]
190
191 // Enter the starting point of original signal=1
192 //    1.   2.   3.
193 //   -1.  -2.  -3.
194
195 // Enter the input sequence to perform Scaling
      Operation
196 // Enter input Sequence :=  [1 3 5 7 9]
197 // Enter starting point of originalsignal:= 1
198
199 // Enter Compression Time Scaling factor: = 0.5
```

```
200
201 //     2.    4.    6.    8.    10.
202
203 // Enter the input sequence to perform shifting
    Operation
204 // Enter the input sequence :=  [1 3 5 ]
205 // Enter the starting point of original signal := 1
206 // Enter the delay := 0.4
207 //    1.4    2.4    3.4
```

Scilab code Solution 3.2 To perform Energy and Average Power Operations on Various Signals and Sequences

```
1  //Experiment Number: 3.2
2  //Write a program to perform Energy and Average
     power operations on various Signals and Sequences
3  //Basic Simulation Laboratory
4  //B.Tech II Year I Sem
5  //Studdent Name:                Enrolement Number:
6  // Course Instructor: Dr.Kantipudi MVV Prasad,
7  // Sreyas Institute Of Engineering & Technlogy,
     Hyderabad.
8  //
   ------------------------------------------------------------------------

9
10 // OS : Windows 10.1
11 // Scilab 6.0.2
12
13
14 clc;
15 close
16 clear ;
17
18
```

```
19
20 // Energy and Average power of the given sequence
21
22 p = input('Enter the sequence = ');
23 M = length(p);
24 disp('The length of the Entered sequence is =')
25 disp(M)
26 sum = 0;
27 for i = 1:M,
28 sum=sum +(i*i);
29 end;
30 disp('Energy of the given sequence is = ');
31 Energy =sum
32 disp(Energy);
33 disp('Average Power of the given sequence is = ');
34 Average_power = sum/M
35 disp(Average_power)
36
37 // Energy and Average power of a signal
38
39 t = 0:0.01:4;
40 s = cos(2*%pi*t);
41 M = length(s);
42 disp('The length of the Entered Signal is =')
43 disp(M)
44
45 sum = 0;
46 for i = 1:M,
47 sum=sum+(i*i);
48 end;
49 disp('Energy of the given signal is = ');
50 Energy = sum
51 disp(Energy)
52 disp('Average Power of the given signal is = ');
53 Average_power = sum/M
54 disp(Average_power)
55
56
```

```
57
58 // Enter the sequence = [1 3 5 7 9]
59
60
61 // The length of the Entered sequence is =
62
63 //    5.
64
65 // Energy of the given sequence is =
66
67 //    55.
68
69 // Average Power of the given sequence is =
70
71 //    11.
72
73 // The length of the Entered Signal is =
74
75 //    401.
76
77 // Energy of the given signal is =
78
79 //    21574201.
80
81 // Average Power of the given signal is =
82
83 // 53801.
```

Experiment: 4

Finding the Even and Odd parts of Signal/Sequence and Real and Imaginary parts of Signal.

Scilab code Solution 4.1 Finding Even and Odd Parts of the Signal

```
1 //Experiment Number: 4.1
2 //Write a program to find Even and odd parts of the
    signal
3 //Basic Simulation Laboratory
4 //B.Tech II Year I Sem
5 //Studdent Name:                Enrolement Number:
6 // Course Instructor: Dr.Kantipudi MVV Prasad,
7 // Sreyas Institute Of Engineering & Technlogy,
    Hyderabad.
8 //
  ------------------------------------------------------------------------
9
10 // OS : Windows 10.1
11 // Scilab 6.0.2
```

```
12
13
14 clc;
15 close
16 clear ;
17
18 // Even and odd parts of a signal
19
20 t=0:.005:4*%pi;
21
22 x=sin(t)+cos(t); // x(t)=sint(t)+cos(t)
23
24 subplot(2,2,1)
25 plot2d3(t,x)
26 xlabel('t');
27 ylabel('amplitude')
28 title('input Signal f(t)')
29
30 y=sin(-t)+cos( -t) // y=x(-t)
31 subplot(2,2,2)
32 plot2d3(t,y)
33 xlabel('t');
34 ylabel('Amplitude')
35 title('Input Signal f(t)=-t') ;
36
37 z=x+y
38 subplot(2,2,3);
39 plot2d3(t,z/2);
40 xlabel('t');
41 ylabel('Amplitude');
42 title('Even Part of the signal')
43
44 p=x-y;
45 subplot(2,2,4)
46 plot2d3(t,p/2)
47 xlabel('t');
48 ylabel('Amplitude');
49 title('Odd Part of the signal');
```

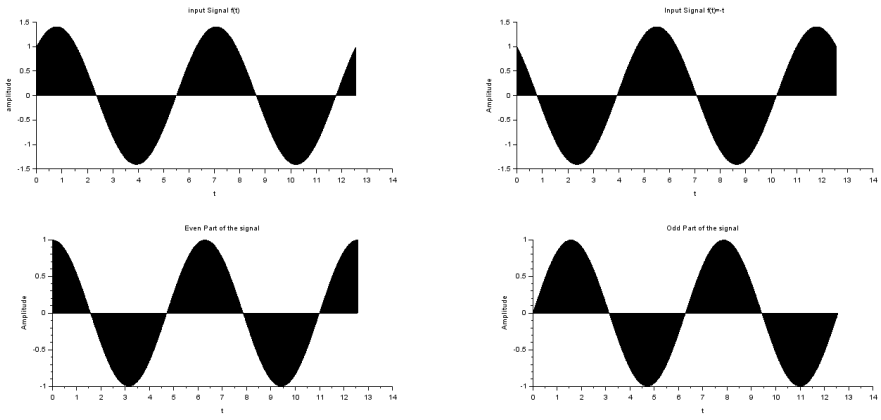

Figure 4.1: Finding Even and Odd Parts of the Signal

Scilab code Solution 4.2 Finding Even and Odd Parts of Sequence

```
1 //Experiment Number: 4.2
2 //Write a program to find Even and odd parts of
    sequence
3 //Basic Simulation Laboratory
4 //B.Tech II Year I Sem
5 //Studdent Name:                    Enrolement Number:
6 // Course Instructor: Dr.Kantipudi MVV Prasad,
7 // Sreyas Institute Of Engineering & Technlogy,
    Hyderabad.
8 //
  ________________________________________________________
9
10 // OS : Windows 10.1
11 // Scilab 6.0.2
```

```
12
13
14 clc;
15 close ;
16 clear ;
17
18
19 // Even and Odd part of Sequence:
20
21 x = input('Enter the sequence : ');
22
23 y = -x;
24
25 subplot(2,2,1);
26 plot2d3(x);
27 xlabel('Time ------> ');
28 ylabel('Amplitude ------>');
29 title('Original signal f(t)');
30
31 subplot(2,2,2);
32 plot2d3(y);
33 xlabel('Time ------> ');
34 ylabel('Amplitude ------>');
35 title('Original signal f(-t)');
36
37 even =0.5*(x + y);
38
39 subplot(2,2,3);
40 plot(even);
41 xlabel('Time ------> ');
42 ylabel('Amplitude ------>');
43 title('Even part');
44
45 odd = 0.5*(x - y);
46
47 subplot(2,2,4);
48 plot2d3(odd);
49 xlabel('Time ------> ');
```

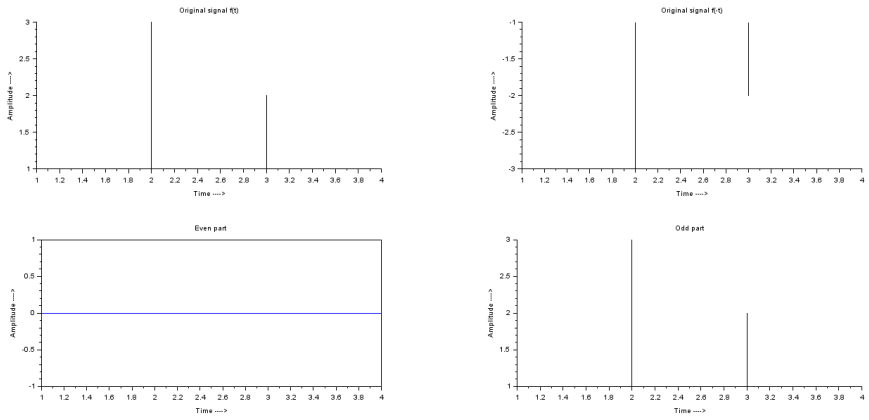

Figure 4.2: Finding Even and Odd Parts of Sequence

```
50 ylabel('Amplitude ------>');
51 title('Odd part');
52
53 // Enter the sequence : [1 3 2 1]
```

Scilab code Solution 4.3 Finding Real and Imaginary parts of Signal or Sequence

```
1 //Experiment Number: 4.3
2 //Write a program to find real and imaginary parts
     of signal/Sequence
3 //Basic Simulation Laboratory
4 //B.Tech II Year I Sem
5 //Studdent Name:                Enrolement Number:
6 // Course Instructor: Dr.Kantipudi MVV Prasad,
```

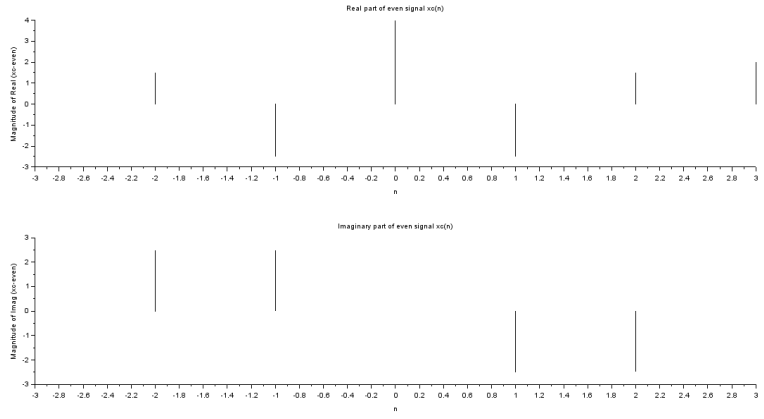

Figure 4.3: Finding Real and Imaginary parts of Signal or Sequence

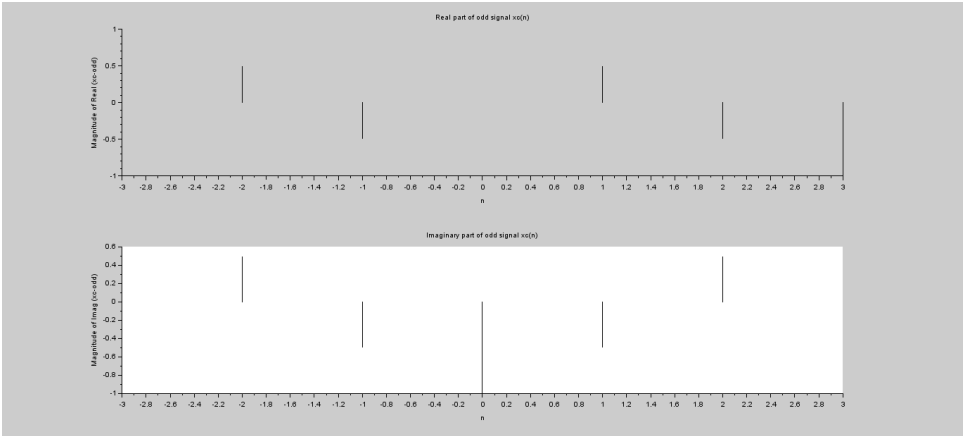

Figure 4.4: Finding Real and Imaginary parts of Signal or Sequence

```
7  // Sreyas Institute Of Engineering & Technlogy,
     Hyderabad.
8  //
   ____________________________________________________________________


9
10 // OS : Windows 10.1
11 // Scilab 6.0.2
12
13
14 clc;
15 close
16 clear ;
17
18
19 // Real and Imaginary parts of even and odd signal:
20
21 x=input('Enter the complex Numbers Sequence: ');
22 n = -3 : 3;
23 xc = conj( x );
24 xc_folded = xc(: , $ : -1 : 1);
25 xc_even = 0.5 * [x + xc_folded];
26 xc_odd = 0.5 * [x - xc_folded];
27
28 subplot(2,1,1) ;
29 plot2d3(n , real(xc_even));
30 title('Real part of even signal xc(n)')
31 xlabel ( ' n ' );
32 ylabel ('Magnitude of Real (xc-even)');
33
34 subplot(2,1,2) ;
35 plot2d3( n , imag(xc_even) )
36 title('Imaginary part of even signal xc(n)')
37 xlabel ( ' n ' );
38 ylabel ('Magnitude of Imag (xc-even)');
39
40 figure;
41
```

```
42 subplot(2,1,1) ;
43 plot2d3( n , real(xc_odd));
44 title('Real part of odd signal xc(n)')
45 xlabel ( ' n ' );
46 ylabel ('Magnitude of Real (xc-odd)');
47
48 subplot(2,1,2) ;
49 plot2d3( n , imag(xc_odd));
50 title('Imaginary part of odd signal xc(n)')
51 xlabel ( ' n ' );
52 ylabel ('Magnitude of Imag (xc-odd)');
53
54 // Enter the complex Numbers Sequence: [3, 2+3*%i,
   -3+2*%i, 4-1*%i, -2-3*%i, 1-2*%i, 1]
```

Experiment: 5

Convolution for Signals and sequences.

Scilab code Solution 5.1 Convolution of any two signals and sequences

```
1 //Experiment Number: 5
2 //Write a program to perform convolution of any two
     signals and sequences.
3 //Basic Simulation Laboratory
4 //B.Tech II Year I Sem
5 //Studdent Name:                Enrolement Number:
6 // Course Instructor: Dr.Kantipudi MVV Prasad,
7 // Sreyas Institute Of Engineering & Technlogy,
     Hyderabad.
8 //
   ________________________________________________________________
9
10 // OS : Windows 10.1
11 // Scilab 6.0.2
12
13
14 clc;
15 close
```

```
clear ;

// Convolution of two Sequences

x=input('Enter the Input Sequence : ');
h=input('Enter the Impulse Sequence : ');

subplot(3,1,1);
plot2d3(x);
plot(x)
title('Input Sequence')
xlabel (' n ');
ylabel ('x(n)');

subplot(3,1,2);
plot2d3(h);
plot(h);
title('Impulse Sequence')
xlabel (' n ');
ylabel ('h(n)');


Y= conv(x,h);
disp('Convoluted output =');
disp(Y);
subplot(3,1,3);
plot2d3(Y);
plot(Y);
title("Linear Convolution of two Sequences");
xlabel (' n ');
ylabel ('Y(n)');


// Convolution of two Signals

t = 1:20;
x = sin(t);
h = squarewave(t);
```

```
54
55 figure();
56 subplot(3,1,1);
57 plot2d3(x);
58 plot(x);
59 title('Input Signal')
60 xlabel (' n ');
61 ylabel ('x(n)');
62
63 subplot(3,1,2);
64 plot2d3(h);
65 plot(h);
66 title('Impulse Response')
67 xlabel (' n ');
68 ylabel ('h(n)');
69
70 o = conv(x,h);
71
72 subplot(3,1,3);
73 plot2d3(o);
74 plot(o);
75 title("Convolution of two Signals");
76
77 xlabel (' n ');
78 ylabel ('Y(n)');
79
80 // Input Paramaters
81 //  Enter the Input Sequence : [1 2 3]
82 // Enter the Impulse Sequence : [-1 2 2]
83 //  Convoluted output =
84 //  -1.   0.   3.   10.   6.
```

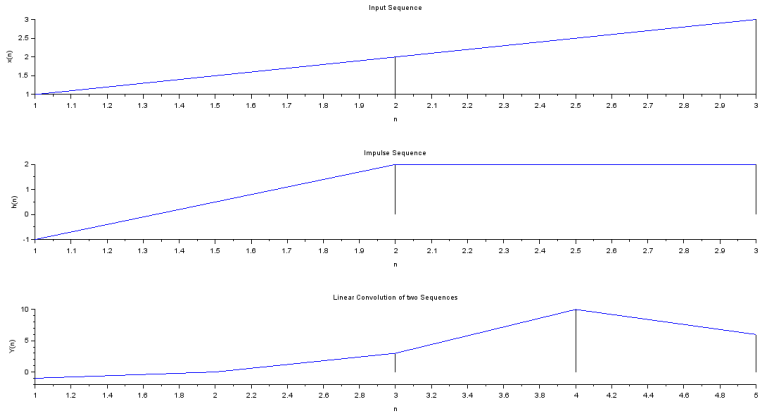

Figure 5.1: Convolution of any two signals and sequences

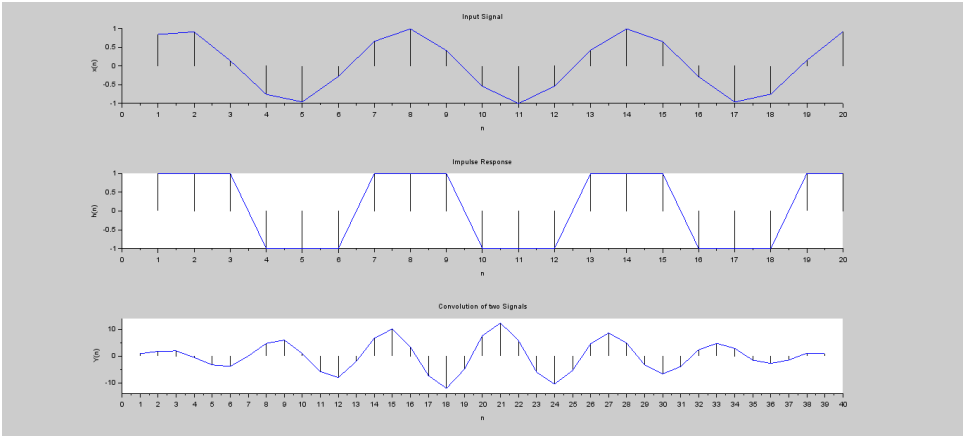

Figure 5.2: Convolution of any two signals and sequences

Experiment: 6

Auto Correlation and Cross Correlation for Signals and Sequences.

Scilab code Solution 6.1 Auto correlation of signals and sequences

```
1 //Experiment Number: 6.1
2 //Write a program to compute Auto correlation and
    Cross correlation between signals and sequences.
3 //Basic Simulation Laboratory
4 //B.Tech II Year I Sem
5 //Studdent Name:                Enrolement Number:
6 // Course Instructor: Dr.Kantipudi MVV Prasad,
7 // Sreyas Institute Of Engineering & Technlogy,
    Hyderabad.
8 //
  ------------------------------------------------------------------------
9
10 // OS : Windows 10.1
11 // Scilab 6.0.2
12
13
```

```
14 clc;
15 close
16 clear ;
17
18 // Auto correlation of a sequence
19
20
21 a = input('Enter the sequence ....:: ');
22
23 res = xcorr(a);
24
25 disp(res);
26
27 subplot(2,1,1);
28 plot2d3(a);
29 xlabel('------> Samples');
30 ylabel('------> Amplitude');
31 title('Input Sequence');
32
33 subplot(2,1,2);
34 plot2d3(res);
35 xlabel('------> Samples');
36 ylabel('------> Amplitude');
37 title('Output Sequence');
38
39 // Auto correlation of a signal
40
41
42 t = 0:0.01:2;
43 a = cos(2 * %pi * t);
44 res = xcorr(a);
45
46 figure();
47
48 subplot(2,1,1);
49 plot(a);
50 xlabel('------> Samples');
51 ylabel('------> Amplitude');
```

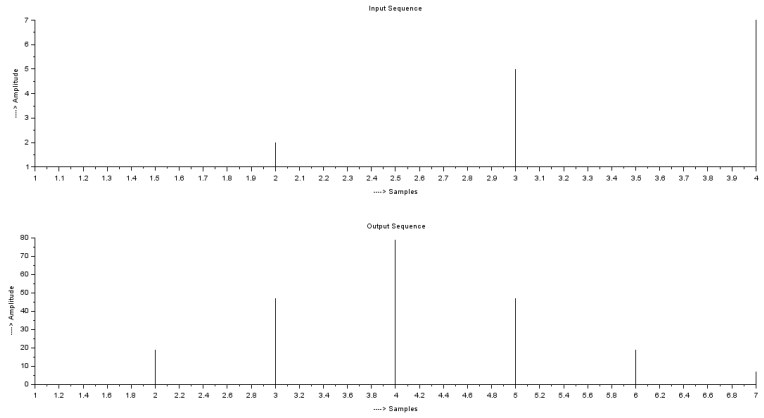

Figure 6.1: Auto correlation of signals and sequences

```
52 title('Input Sequence');
53
54 subplot(2,1,2);
55 plot(res);
56 xlabel('---------> Samples');
57 ylabel('---------> Amplitude');
58 title('Output Sequence');
59
60 // Input Arguments
61
62 // Enter the sequence ....:: [ 1 2 5 7]
63
64 //    7.    19.    47.    79.    47.    19.    7.
```

Scilab code Solution 6.2 Cross correlation of signals and sequences

```
1 //Experiment Number: 6.2
```

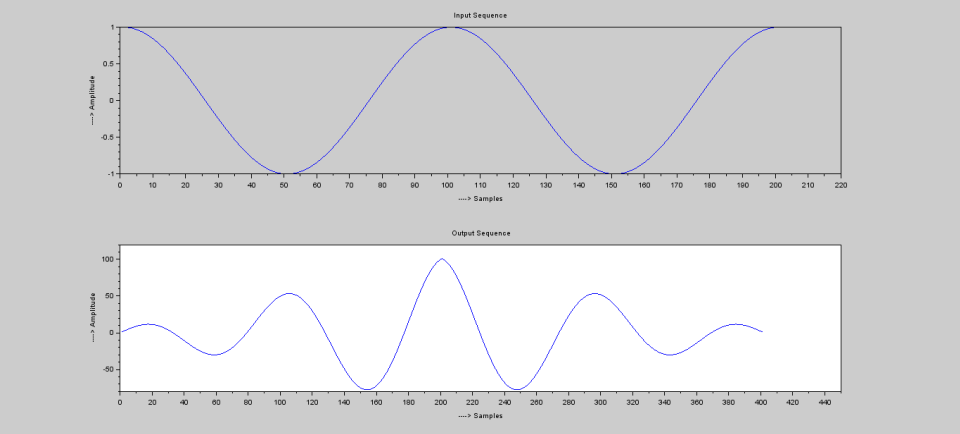

Figure 6.2: Auto correlation of signals and sequences

```
2  //Write a program to compute Cross correlation
       between signals and sequences.
3  //Basic Simulation Laboratory
4  //B.Tech II Year I Sem
5  //Studdent Name:                Enrolement Number:
6  // Course Instructor: Dr.Kantipudi MVV Prasad,
7  // Sreyas Institute Of Engineering & Technlogy,
       Hyderabad.
8  //
       ____________________________________________________________________________


9
10 // OS : Windows 10.1
11 // Scilab 6.0.2
12
13
14 clc;
15 close
16 clear ;
17
18 // Cross correlation of a two sequences
19
20 a = input('Enter the first sequence ....:: ');
```

```
21 b = input('Enter the second sequence ...:: ');
22
23 r =xcorr(a,b);
24
25 subplot(3,1,1);
26 plot2d3(a);
27 xlabel('----> Samples');
28 ylabel('----> Amplitude');
29 title('Input Sequence(1)');
30
31 subplot(3,1,2);
32 plot2d3(b);
33 xlabel('----> Samples');
34 ylabel('----> Amplitude');
35 title('Input Sequence(2)');
36
37 subplot(3,1,3);
38 plot2d3(r);
39 xlabel('----> Samples');
40 ylabel('----> Amplitude');
41 title('Cross correlation of a two sequences');
42
43 // Cross correlation of a two signals
44
45
46 t = 0:0.01:2;
47 a = cos(2 *%pi * t);
48 b = sin(2 *%pi * t);
49 res = xcorr(a,b);
50 figure();
51
52 subplot(3,1,1);
53 plot(a);
54 xlabel('----> Samples');
55 ylabel('----> Amplitude');
56 title('Input signal(1)');
57
58 subplot(3,1,2);
```

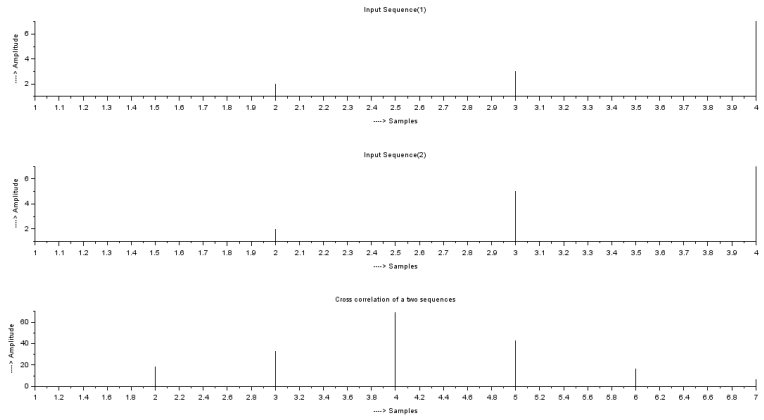

Figure 6.3: Cross correlation of signals and sequences

```
59 plot(b);
60 xlabel('------> Samples');
61 ylabel('------> Amplitude');
62 title('Input Signal(2)');
63
64 subplot(3,1,3);
65 plot(res);
66 xlabel('------> Samples');
67 ylabel('------> Amplitude');
68 title('Cross correlation of a two signals');
69
70 // Enter the first sequence ....:: [ 1 2 3 7]
71
72 // Enter the second sequence ...:: [ 1 2 5 7]
```

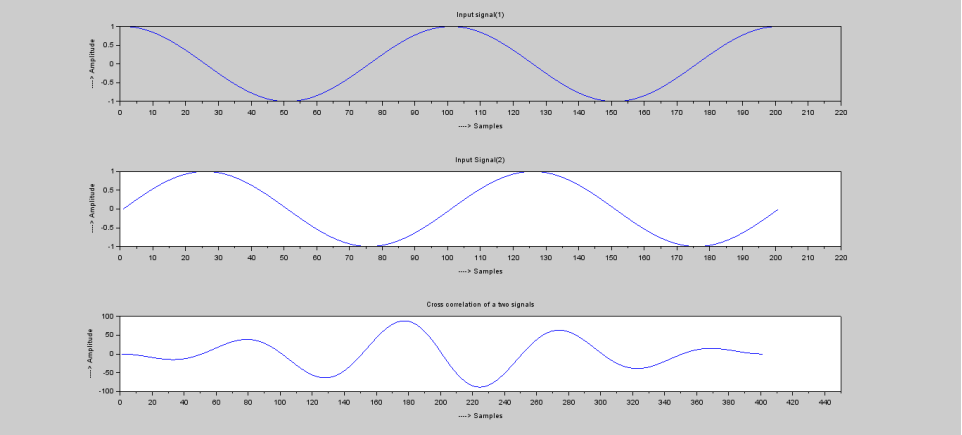

Figure 6.4: Cross correlation of signals and sequences

Experiment: 7

Verification of Linearity and Time Invariance Properties of a given Continuous/Discrete System

Scilab code Solution 7.1 Verifying linearity property of a given discrete system

```
1 //Experiment Number: 7.1
2 //Write a program to Verify linearity property of a
    given continuous/discrete system.
3 //Basic Simulation Laboratory
4 //B.Tech II Year I Sem
5 //Studdent Name:                Enrolement Number:
6 // Course Instructor: Dr.Kantipudi MVV Prasad,
7 // Sreyas Institute Of Engineering & Technlogy,
    Hyderabad.
8 //
  ------------------------------------------------------------------------
9
10
```

```
11 // OS : Windows 10.1
12 // Scilab 6.0.2
13
14 clc;
15 clear all;
16 close ;
17
18 // Enter two input sequences and impulse sequence
19
20 x1 = input (' Enter the samples of x1 ');
21
22 x2 = input (' Enter the samples of x2 ');
23
24 if(length(x1)~=length(x2))
25
26 disp('Error...!: Lengths of two input sequences [x1
      and x2] are different'); return;
27
28 end;
29
30 h = input (' Enter  the samples of h ');
31
32 //Length of the output sequence
33
34 N = length(x1) + length(h) -1;
35
36 disp('length of the output signal will be ');
37
38 disp(N);
39
40 // Enter scaling factors
41
42 a1 = input (' The scale factor a1 is ');
43 a2 = input (' The scale factor a2 is ');
44
45 x = a1 * x1 + a2 * x2;
46
47 // Response of x and x1
```

```
48
49 yo1 = conv(x,h);
50
51 y1 = conv(x1,h);
52
53 // scaled response of x1
54
55 y1s = a1 * y1;
56
57 // Response of x2
58
59 y2 = conv(x2,h);
60
61 //Scaled Response of x2
62
63 y2s = a2 * y2;
64
65 yo2 = y1s + y2s;
66
67 disp ('Input signal x1 is ');
68 disp(x1);
69
70 disp ('Input signal x2 is ');
71 disp(x2);
72
73 disp ('Output Sequence yo1 is ');
74 disp(yo1);
75
76 disp ('Output Sequence yo2 is');
77 disp(yo2);
78
79 if ( yo1 == yo2 )
80
81 disp(' yo1 = yo2. Hence the LTI system is LINEAR ')
82
83 end;
84
85 // Enter the samples of x1 [ 1 5 7 9]
```

```
86
87 // Enter the samples of x2 [ 4 3 2 2]
88
89 // Enter  the samples of h [1 2 2 2]
90
91
92 // length of the output signal will be
93
94 //  7.
95 // The scale factor a1 is 2
96
97 // The scale factor a2 is 3
98
99
100 // Input signal x1 is
101
102 //   1.   5.   7.   9.
103
104 // Input signal x2 is
105
106 //   4.   3.   2.   2.
107
108 // Output Sequence yo1 is
109
110 //   14.   47.   86.   130.   126.   88.   48.
111
112 // Output Sequence yo2 is
113
114 //   14.   47.   86.   130.   126.   88.   48.
115
116 //  yo1 = yo2. Hence the LTI system is LINEAR
```

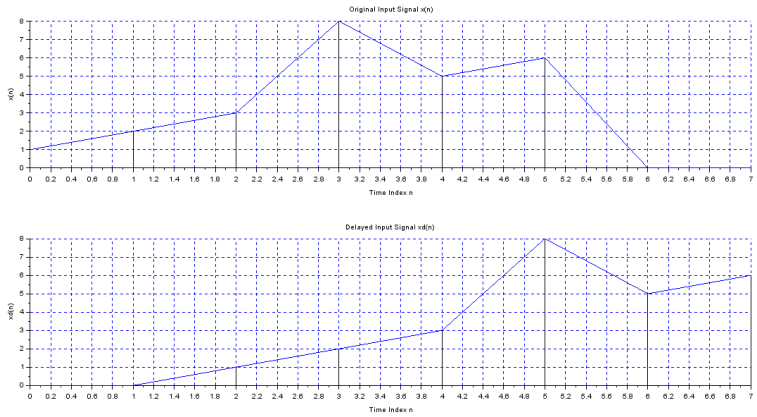

Figure 7.1: Verifying the Time Invariance Property of a given Discrete System

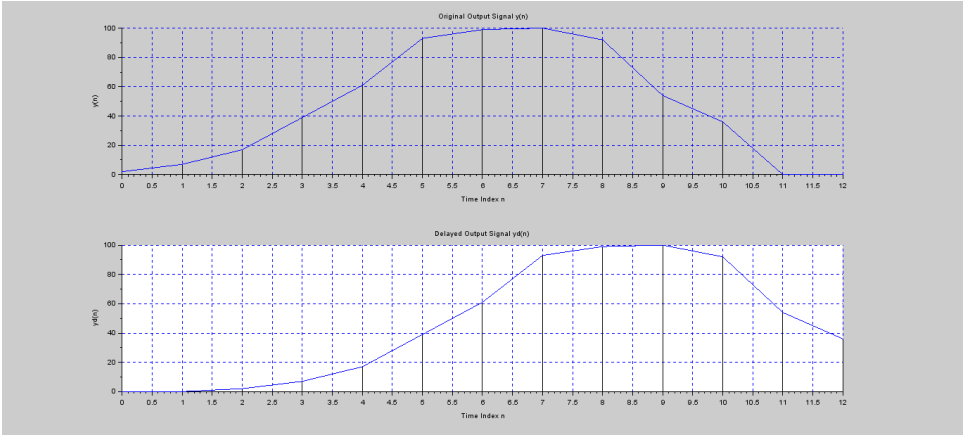

Figure 7.2: Verifying the Time Invariance Property of a given Discrete System

Scilab code Solution 7.2 Verifying the Time Invariance Property of a given Discrete System

```
1 //Experiment Number: 7.2
2 //Write a program to Verify the Time Invariance of a
      given Discrete System.
3 //Basic Simulation Laboratory
4 //B.Tech II Year I Sem
5 //Studdent Name:                Enrolement Number:
6 // Course Instructor: Dr.Kantipudi MVV Prasad,
7 // Sreyas Institute Of Engineering & Technlogy,
     Hyderabad.
8 //
   ------------------------------------------------------------------------------


9
10
11 // OS : Windows 10.1
12 // Scilab 6.0.2
13
14 clc;
15 clear all;
16 close ;
17
18 // Entering two input sequences
19
20 x = input( ' Enter the samples of signal x(n) ' );
21 h = input( ' Enter the samples of signal h(n) ' );
22
23 // original response
24
25 y = conv(x,h);
26
27 disp( ' Enter a POSITIVE number for delay ' );
28
29 d = input( ' Desired delay of the signal is ' );
30
31 //Delayed input
```

```
32
33 xd = [zeros(1,d), x];
34
35 nxd = 0 : length(xd)-1;
36
37 //Delayed output
38
39 yd = conv(xd,h);
40
41 nyd = 0:length(yd)-1;
42
43 disp(' Original Input Signal x(n) is ');
44 disp(x);
45 disp(' Delayed Input Signal xd(n) is ');
46 disp(xd);
47 disp(' Original Output Signal y(n) is ');
48 disp(y);
49 disp(' Delayed Output Signal yd(n) is ');
50 disp(yd);
51
52 xp = [x , zeros(1,d)];
53 subplot(2,1,1);
54 plot2d3(nxd,xp);
55 plot(nxd,xp);
56 xgrid(2);
57
58 xlabel( ' Time Index n ' );
59 ylabel( ' x(n) ' );
60 title( ' Original Input Signal x(n) ' );
61
62 subplot(2,1,2);
63 plot2d3(nxd,xd);
64 plot(nxd,xd);
65 xgrid(2)
66
67 xlabel( ' Time Index n ' );
68 ylabel( ' xd(n) ' );
69 title( ' Delayed Input Signal xd(n) ' );
```

```
70
71 yp = [y zeros(1,d)];
72
73 figure;
74
75 subplot(2,1,1);
76 plot2d3(nyd,yp);
77 plot(nyd,yp);
78 xgrid(2)
79
80 xlabel( ' Time Index n ' );
81 ylabel( ' y(n) ' );
82 title( ' Original Output Signal y(n) ' );
83
84 subplot(2,1,2);
85 plot2d3(nyd,yd);
86 plot(nyd,yd);
87 xgrid(2)
88
89 xlabel( ' Time Index n ' );
90 ylabel( ' yd(n) ' );
91 title( ' Delayed Output Signal yd(n) ' );
92
93
94 //  Enter the samples of signal x(n) [ 1 2 3 8 5 6]
95
96 // Enter the samples of signal h(n) [2 3 5 4 4 6]
97
98
99 //  Enter a POSITIVE number for delay
100 // Desired delay of the signal is 2
101
102
103 //  Original Input Signal x(n) is
104
105 //   1.   2.   3.   8.   5.   6.
106
107 //  Delayed Input Signal xd(n) is
```

```
108
109 //    0.    0.    1.    2.    3.    8.    5.    6.
110
111 //  Original Output Signal y(n) is
112
113 //    2.    7.    17.    39.    61.    93.    99.    100.
       92.    54.    36.
114
115 //  Delayed Output Signal yd(n) is
116
117 //    0.    0.    2.    7.    17.    39.    61.    93.    99.
        100.    92.    54.    36.
```

Experiment: 8

Computation of Unit sample, Unit step and Sinusoidal responses of the given LTI system and verifying its physical realiazability

Scilab code Solution 8.1 Verifying Stability of a given LTI System

```
1 //Experiment Number: 8
2 //Write a program to compute the Unit sample, unit
     step and sinusoidal response of the given LTI
     system and verifying its stability.
3 //Basic Simulation Laboratory
4 //B.Tech II Year I Sem
5 //Studdent Name:                Enrolement Number:
6 // Course Instructor: Dr.Kantipudi MVV Prasad,
7 // Sreyas Institute Of Engineering & Technlogy,
     Hyderabad.
8 //
```

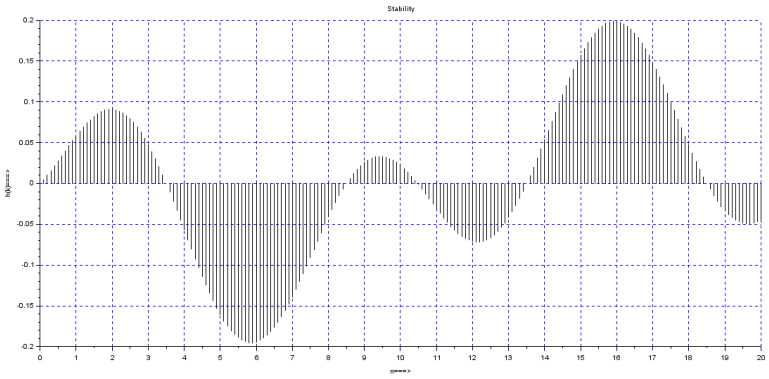

Figure 8.1: Verifying Stability of a given LTI System

```
9
10 // OS : Windows 10.1
11 // Scilab 6.0.2
12
13 // Stability of a given LTI System:
14
15 clc;
16 clear all;
17 close;
18
19 n=0:0.1:20;
20
21 h= input("Enter the System Equation : "); // 0.2*sin
   (0.3*n).*cos(0.2*%pi*n)
22
23 sum=0;
24
25 for k=1:201
26 if abs(h(k))<10^(-6)
27 end
28 sum=sum+h(k);
```

```
29 end
30 disp('The summation value is ....:: ');
31 disp(sum);
32
33 if sum > 5.0983e+008
34 disp('The System is unstable');
35 else
36 disp('The System is stable');
37 end;
38 plot2d3(n,h);
39 xgrid(2);
40 xlabel ( ' n===>' )
41 ylabel ( ' h(k)===>' )
42 title ( ' Stability  ' )
43
44 // Enter the System Equation : 0.2*sin(0.3*n).*cos
   (0.2*%pi.*(n-1))
45
46
47 // The summation value is ....::
48
49 //   0.5909252
50
51 // The System is stable
```

Experiment: 9

Gibbs Phenomenon Simulation

Scilab code Solution 9.1 Verifying the Gibbs phenomenon

```
1
2 //Experiment Number: 9
3 //Write a program to verify the Gibbs phenomenon
4 //Basic Simulation Laboratory
5 //B.Tech II Year I Sem
6 //Studdent Name:                Enrolement Number:
7 // Course Instructor: Dr.Kantipudi MVV Prasad,
8 // Sreyas Institute Of Engineering & Technlogy,
    Hyderabad.
9 //
   ------------------------------------------------------------------------------

10
11 // OS : Windows 10.1
12 // Scilab 6.0.2
13
14 clc;
15 clear all;
16 close ;
```

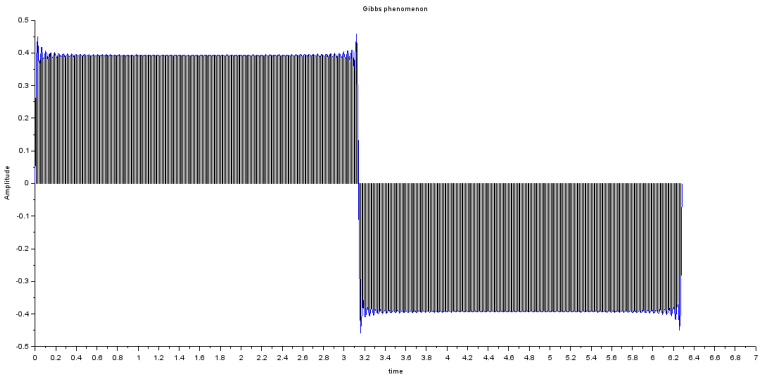

Figure 9.1: Verifying the Gibbs phenomenon

```
17
18 J= 500 //number of points
19 x=linspace(0,2*%pi, J);
20 f= sign(x); //returns array same size as x
21 kp=0.*x; //multiplies everything by x starting with
      0
22 t=150
23 for k=1:2:t
24 kp=kp+(1/2)*sin(k*x)/k;
25 end
26
27 plot2d3(x,kp);
28 plot(x,kp);
29 xlabel('time');
30 ylabel('Amplitude');
31 title('Gibbs phenomenon');
```

Experiment: 10

Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum

Scilab code Solution 10.1 To find the Fourier Transform of a given signal and plotting its magnitude and phase spectrum

```
1 //Experiment Number: 10
2 //Write a program to find the Fourier Transform of a
      given signal and plotting its magnitude and
     phase spectrum.
3 //Basic Simulation Laboratory
4 //B.Tech II Year I Sem
5 //Studdent Name:                Enrolement Number:
6 // Course Instructor: Dr.Kantipudi MVV Prasad,
7 // Sreyas Institute Of Engineering & Technlogy,
     Hyderabad.
```

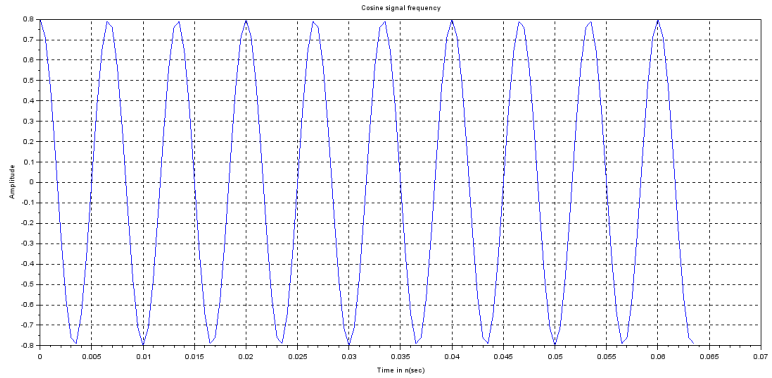

Figure 10.1: To find the Fourier Transform of a given signal and plotting its magnitude and phase spectrum

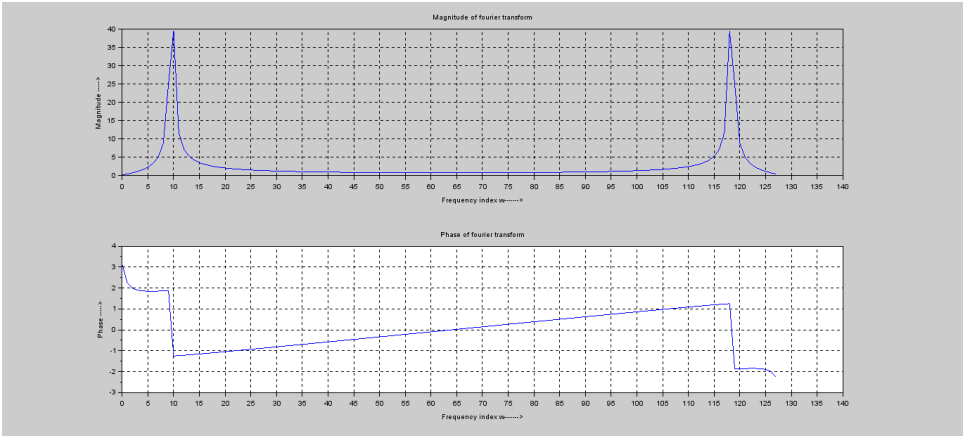

Figure 10.2: To find the Fourier Transform of a given signal and plotting its magnitude and phase spectrum

```
8  //
   ____________________________________________________________________________

9
10 // OS : Windows 10.1
11 // Scilab 6.0.2
12
13 clc;
14 clear all;
15 close ;
16
17 f=150 //(' Frequency in hertzs ');
18 Fs=2000 //('Samplinf freq in khz ')
19 Ts=1/(Fs);
20 N=128 //('DFT sequence ');
21 n=[0:N-1]*Ts;
22 x=0.8*cos(2*%pi*f*n);
23 plot(n,x);
24 set(gca(),"grid",[1 1]);
25 data_bounds=([0 -1 ; 0.05 1]);
26 title(' Cosine signal frequency ');
27 xlabel('Time in n(sec) ');
28 ylabel(' Amplitude');
29 Y=fft(x);
30 w=0:N-1;
31 figure;
32 Xmag=abs(Y);
33 subplot(2,1,1);
34 plot(w,Xmag);
35 set(gca(),"grid",[1 1]);
36 title(' Magnitude of fourier transform ');
37 xlabel(' Frequency index w------> ');
38 ylabel(' Magnitude ------> ');
39
40 Xphase= atan(imag(Y),real(Y));
41
42 subplot(2,1,2);
43 plot(w,Xphase);
```

```
44 set(gca(),"grid",[1 1]);
45 title(' Phase of fourier transform ');
46 xlabel(' Frequency index w------> ');
47 ylabel(' Phase ------> ');
```