SIGNAL PROCESSING

CODING - ASSIGNMENT

(SCILAB EXERCISE)

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Section: ECE - F

SIGNAL PROCESSING

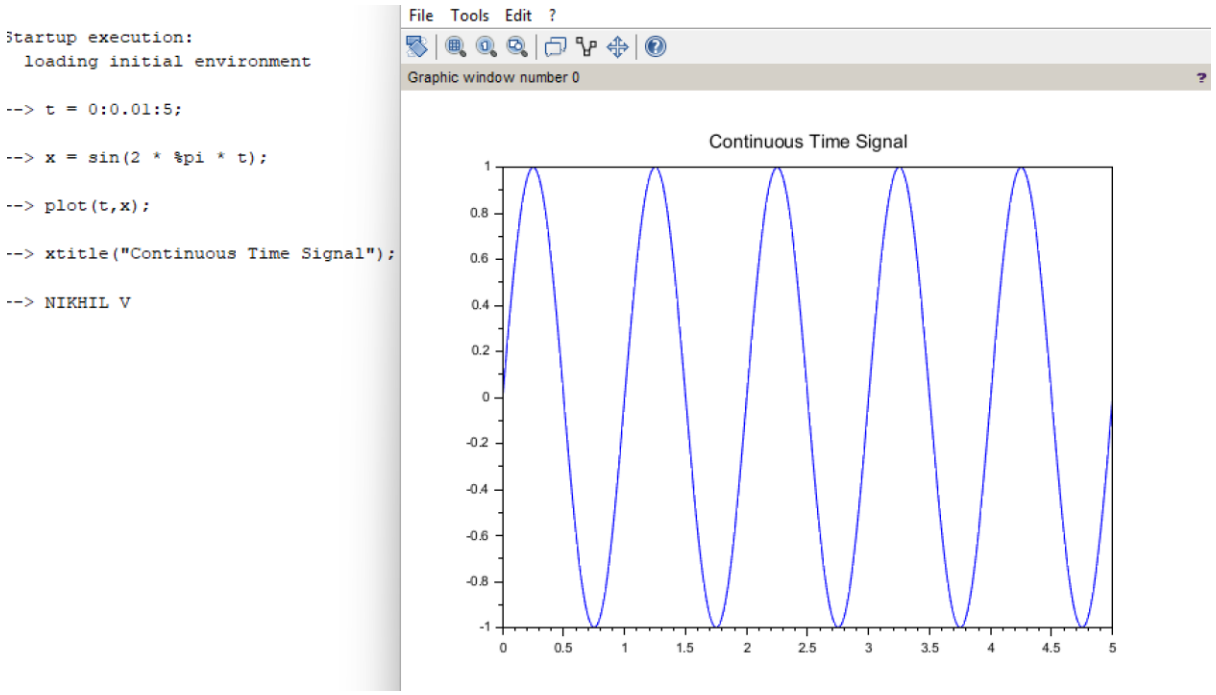
1. Generate the basic deterministic CT and DT signals such as unit impulse, unit step, sinusoidal and exponential signals

CONTINUOUS TIME SIGNAL

CODE:

```
t = 0:0.01:5;

x = sin(2 * %pi * t);

plot(t,x);

xtitle("Continuous Time Signal");
```

OUTPUT:

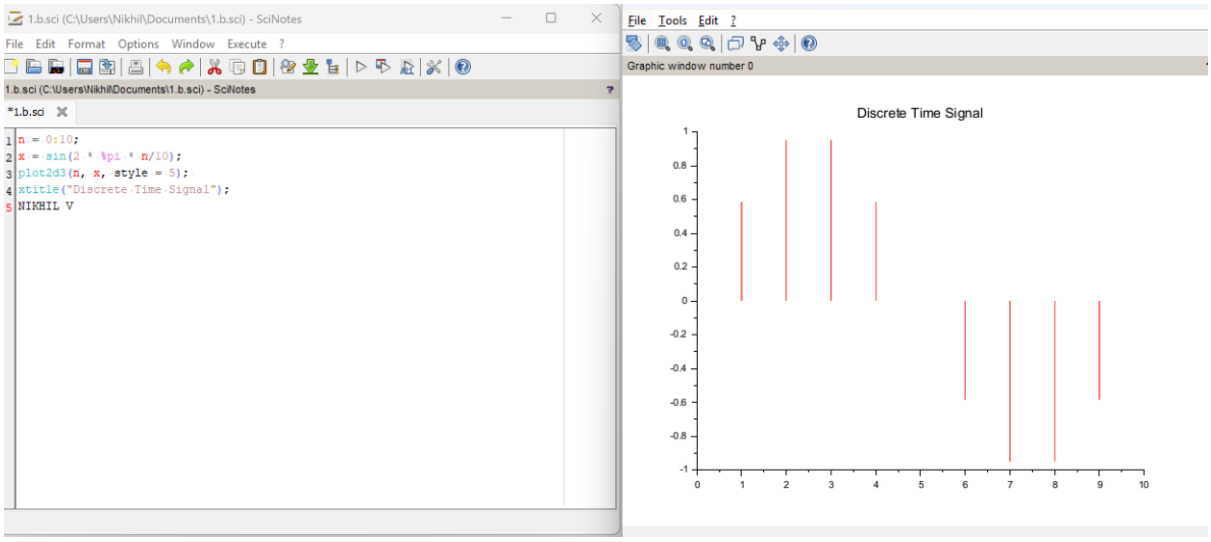


DISCRETE TIME SIGNAL:

CODE:

```
n = 0:10;

x = sin(2 * %pi * n/10);

plot2d3(n,x);

xtitle("Discrete Time Signal");
```

OUTPUT:



2. Perform the basic operations such as addition, multiplication.

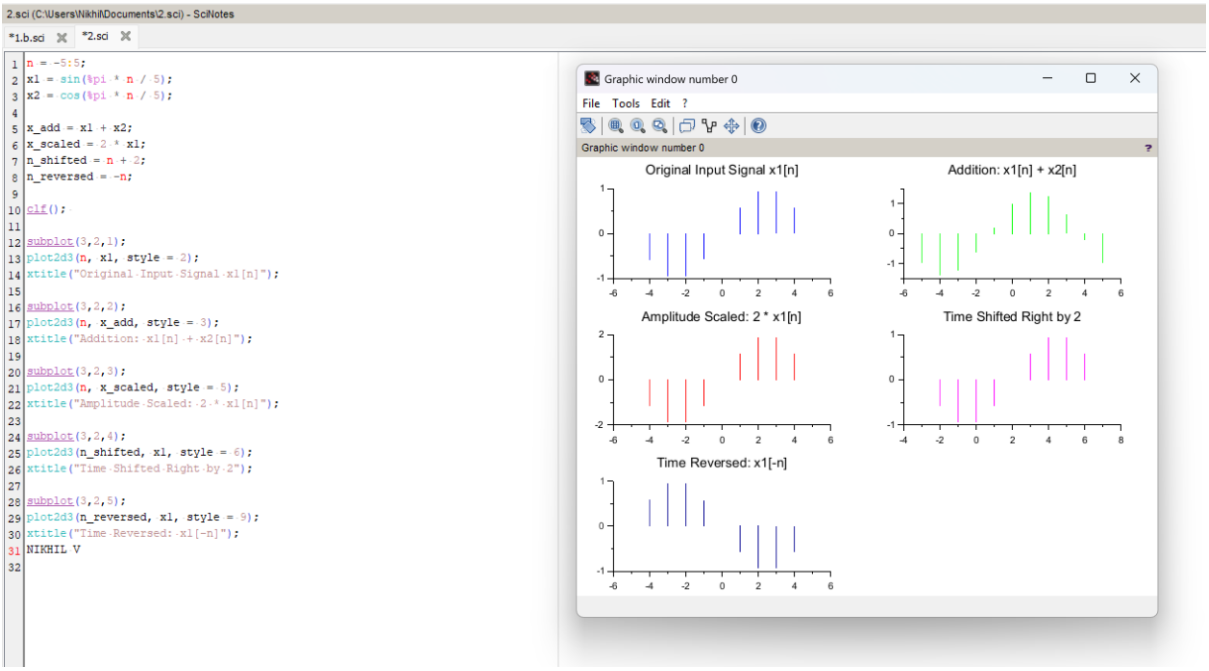
BASIC OPERATIONS

CODE:

```
n = -5:5;

x1 = sin(%pi * n / 5);

x2 = cos(%pi * n / 5);


x_add = x1 + x2;

x_scaled = 2 * x1;

n_shifted = n + 2;

n_reversed = -n;


clf();


subplot(3,2,1);

plot2d3(n, x1, style = 2);

xtitle("Original Input Signal x1[n]");
```

```
subplot(3,2,2);
plot2d3(n, x_add, style = 3);
xtitle("Addition: x1[n] + x2[n]");

subplot(3,2,3);
plot2d3(n, x_scaled, style = 5);
xtitle("Amplitude Scaled: 2 * x1[n]");

subplot(3,2,4);
plot2d3(n_shifted, x1, style = 6);
xtitle("Time Shifted Right by 2");

subplot(3,2,5);
plot2d3(n_reversed, x1, style = 9);
xtitle("Time Reversed: x1[-n]");
```

OUTPUT:



3. Perform linear convolution of DT signals.

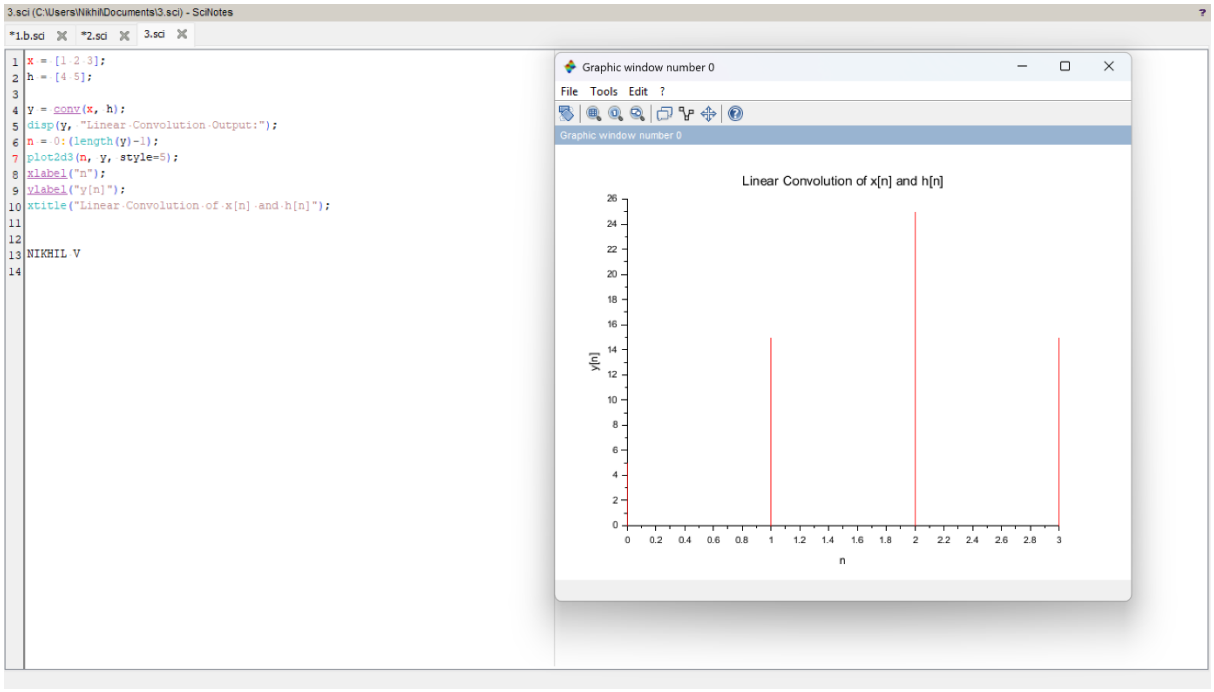
LINEAR CONVOLUTION

CODE:

```
x = [1 2 3];

h = [4 5];

y = conv(x, h);

disp(y, "Linear Convolution Output:");

n = 0:(length(y)-1);

plot2d3(n, y, style=5);

xlabel("n");

ylabel("y[n]");

xtitle("Linear Convolution of x[n] and h[n]");
```

OUTPUT:

```
--> exec('C:\Users\Nikhil\Documents\3.sci', -1)
   4.    13.    22.    15.
  "Linear Convolution Output:"
```



4. Perform Circular convolution of DT Signals.

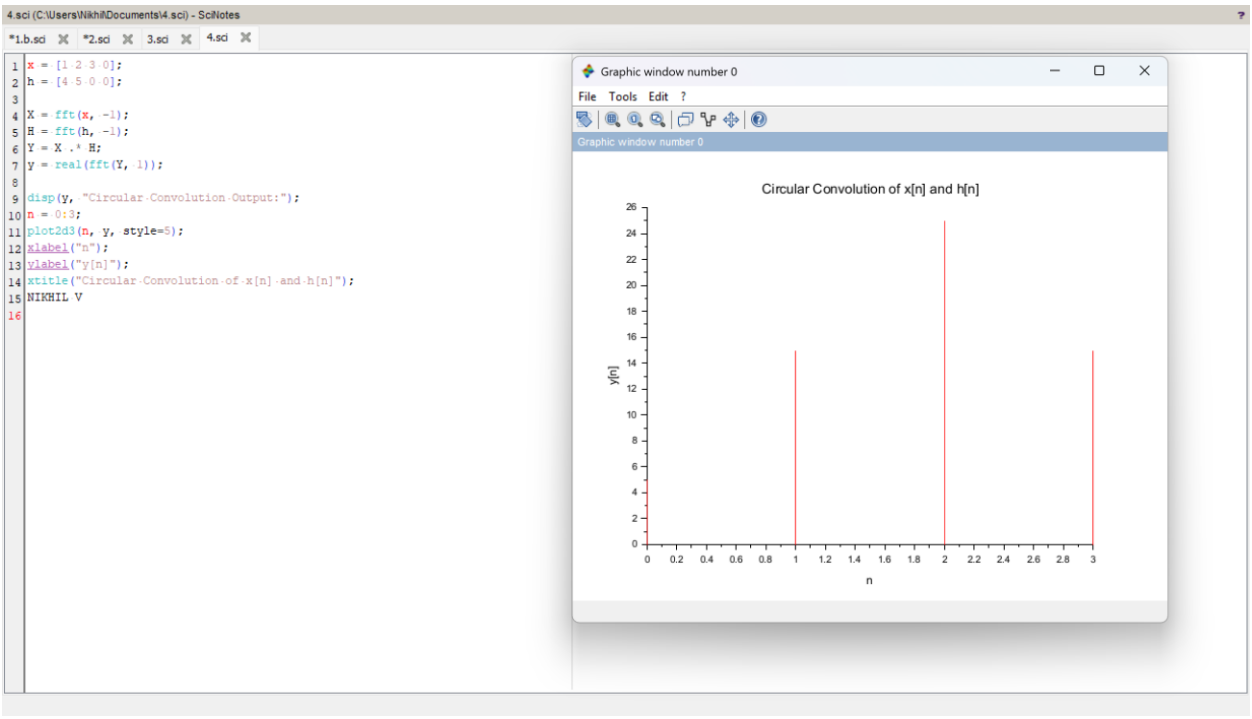
CIRCULAR CONVOLUTION

CODE:

```
x = [1 2 3 0];

h = [4 5 0 0];

X = fft(x, -1);

H = fft(h, -1);

Y = X .* H;

y = real(fft(Y, 1));

disp(y, "Circular Convolution Output:");

n = 0:3;

plot2d3(n, y, style=5);

xlabel("n");

ylabel("y[n]");

xtitle("Circular Convolution of x[n] and h[n]");
```

OUTPUT:

```
--> exec('C:\Users\Nikhil\Documents\4.sci', -1)
   4.    13.    22.    15.
  "Circular Convolution Output:"
```



5. Perform 4-point and 8-point DFT.

4-POINT WITH OUTPUT:

CODE:

```
x = [1,2,3,4];

X = fft(x,-1);

disp("4-Point DFT of x = [1 2 3 4]:",X);
```

OUTPUT:

```
--> x = [1,2,3,4];

--> X = fft(x,-1);

--> disp("4-Point DFT of x = [1 2 3 4]:",X);

  "4-Point DFT of x = [1 2 3 4]:"

   10. + 0.i  -2. + 2.i  -2. + 0.i  -2. - 2.i

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```

8-POINT WITH OUTPUT:

```
x = [1 2 3 4 5 6 7 8];

X = fft(x, -1);

disp("8-Point DFT of x = [1 2 3 4 5 6 7 8]:", X);
```

OUTPUT:

```
--> x = [1 2 3 4 5 6 7 8];

--> X = fft(x, -1);

--> disp("8-Point DFT of x = [1 2 3 4 5 6 7 8]:",X);

  "8-Point DFT of x = [1 2 3 4 5 6 7 8]:"

         column 1 to 7

   36. + 0.i  -4. + 9.6568542i  -4. + 4.i  -4. + 1.6568542i  -4. + 0.i  -4. - 1.6568542i  -4. - 4.i

         column 8

  -4. - 9.6568542i

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```