DIGITAL SIGNAL PROCESSING LAB

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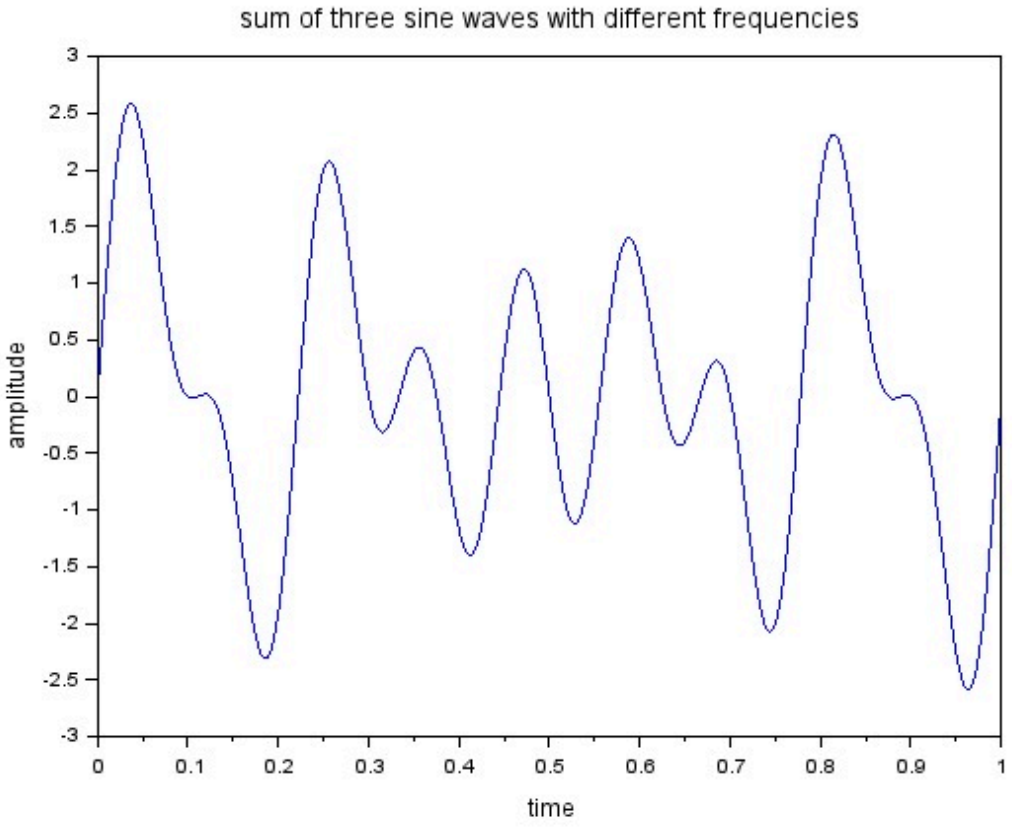
ASSIGNMENT – 1

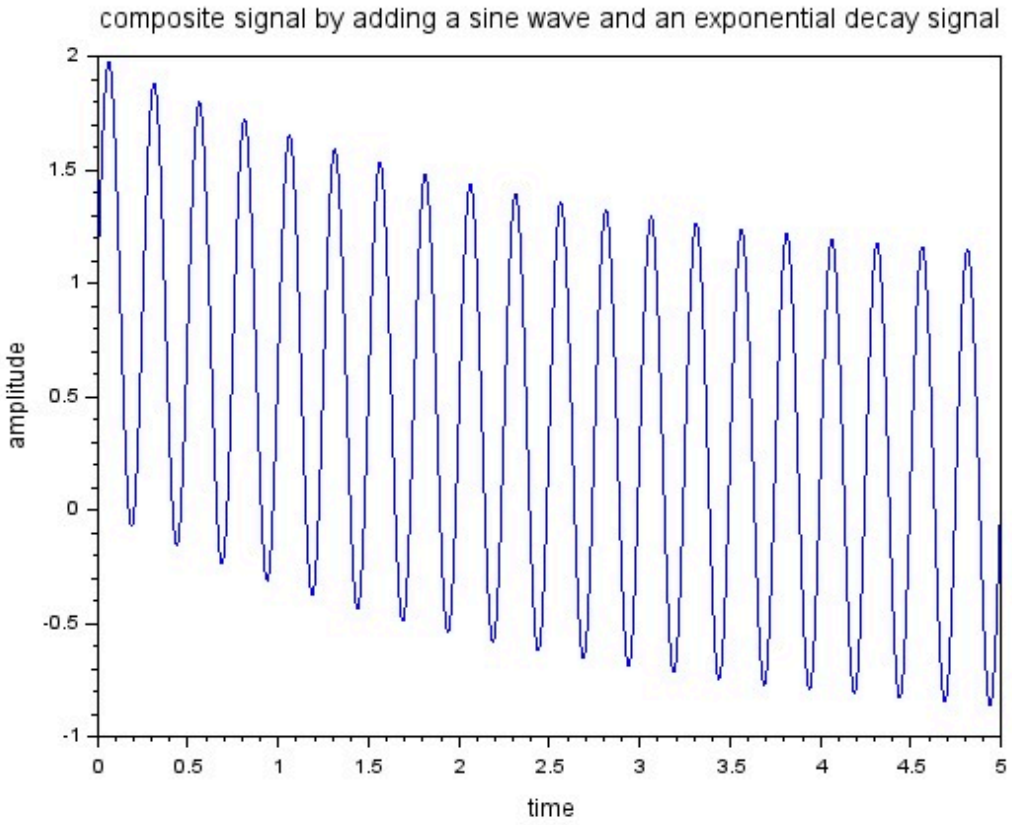
1. Write a Scilab code to generate a signal that is the sum of three sine waves with different frequencies 5 Hz, (birthday) Hz, and (birthday + 5) Hz. Plot the signal.

```
clc;
clear;
close;
clf;
f1 = 5;
f2 = 4;
f3 = 9;
t = 0:0.001:1;
s =
sin(2*%pi*f1*t)+sin(2*%pi*f2*t)+sin(2*%pi*f3*
t);
xlabel("time");
ylabel("amplitude");
title("sum of three sine waves with different
frequencies");
plot(t,s);
```



2. Write a Scilab code to generate a composite signal by adding a sine wave of frequency (birthday) Hz and an exponential decay signal $e^{-0.(birthday)t}$. Plot the composite signal

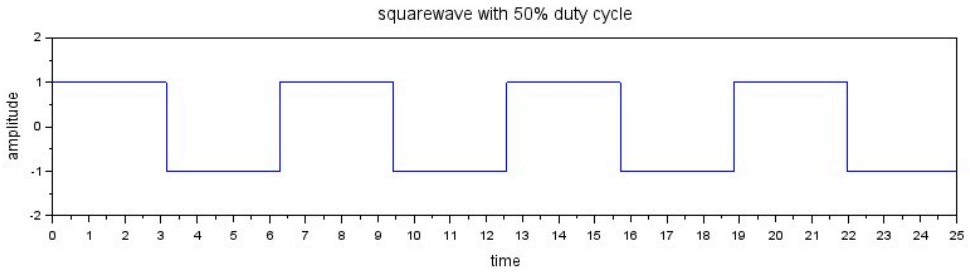
```
clc;
clear;
close;
clf;
a = 4;
t = 0:0.001:5;
s = sin(2*%pi*a*t)+(exp(-0.4*t));
xlabel("time");
ylabel("amplitude");
title("composite signal by adding a sine wave
and an exponential decay signal");
plot(t,s);
```

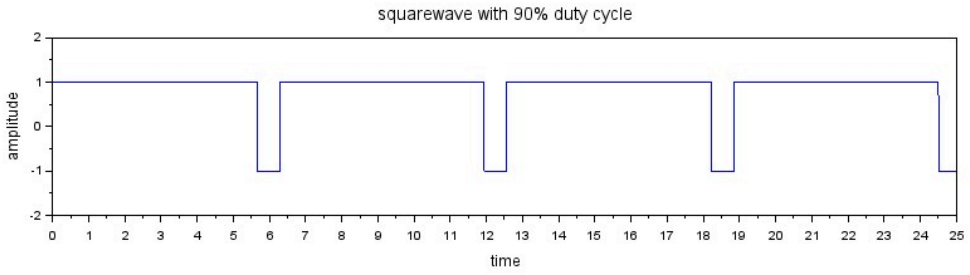


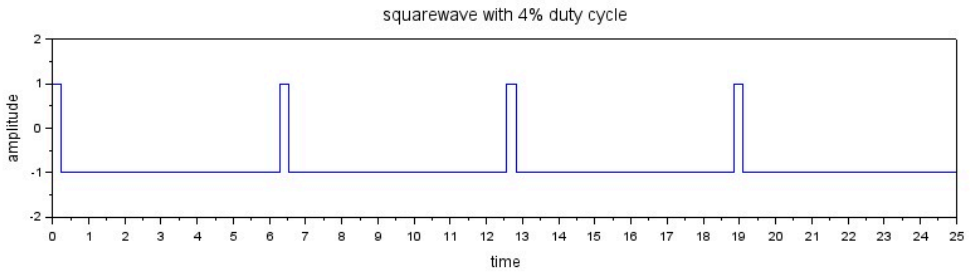
3. Write a Scilab code to generate a square with a) duty cycle = 50% b) duty cycle = 90% c) duty cycle = (birthday)%

```
clc;
clear;
close;
clf;
t = 0:0.001:50;
dc1=50;
dc2=90;
dc3=4;
s1 = squarewave(t,dc1);
s2 = squarewave(t,dc2);
s3 = squarewave(t,dc3);
subplot(3, 1, 1);
xlabel("time");
ylabel("amplitude");
title("squarewave with 50% duty cycle");
plot(t,s1);
mtlb_axis([0,25,-2,2]);
subplot(3, 1, 2);
xlabel("time");
ylabel("amplitude");
title("squarewave with 90% duty cycle");
plot(t,s2);
mtlb_axis([0,25,-2,2]);
subplot(3, 1, 3);
xlabel("time");
```

```
ylabel("amplitude");
title("squarewave with 4% duty cycle");
plot(t,s3);
mtlb_axis([0,25,-2,2]);
```

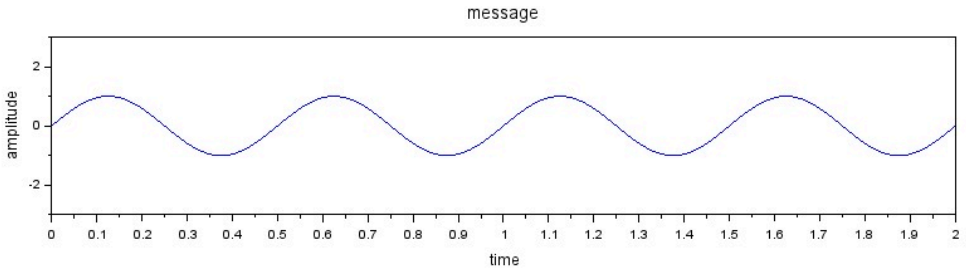


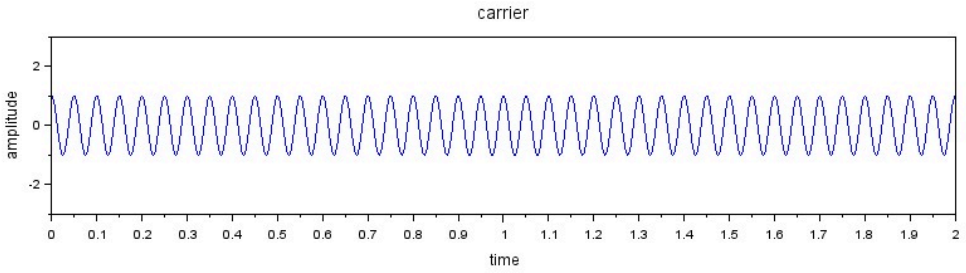


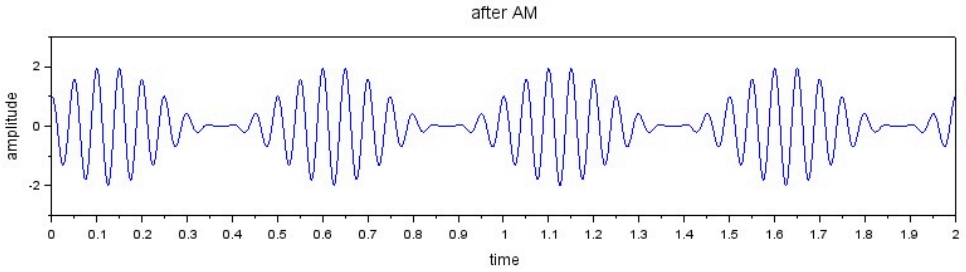


4. Write a Scilab code to generate a carrier signal (cosine wave) with a frequency of 20 Hz and a modulating signal (sine wave) with a frequency of 2 Hz. Perform amplitude modulation and plot the resulting modulated signal.

```
clc;
clear;
close;
clf;
t = 0:0.001:50;
m = sin(2*%pi*2*t);
c = cos(2*%pi*20*t);
am = (1+m).*c;
subplot(3, 1, 1);
xlabel("time");
ylabel("amplitude");
title("message");
plot(t,m);
mtlb_axis([0,2,-3,3]);
subplot(3, 1, 2);
xlabel("time");
ylabel("amplitude");
title("carrier");
plot(t,c);
mtlb_axis([0,2,-3,3]);
subplot(3, 1, 3);
xlabel("time");
ylabel("amplitude");
title("after AM");
plot(t,am);
mtlb_axis([0,2,-3,3]);
```







5. Write a MATLAB code to generate u(n) – u(n-5). Plot the signal

```
% Define the range of n
n = -2:10; % Adjust the range as needed
% Define the unit step function u(n)
u = @(n) double(n >= 0);
% Generate the signal u(n) - u(n-5)
signal = u(n) - u(n-5);
% Plot the signal
stem(n, signal, 'filled');
title('Signal u(n) - u(n-5)');
xlabel('n');
ylabel('Amplitude');
grid on;
axis([-2 10 -0.5 1.5]); % Set the axis limits
```