**Signal Analysis**

**Lab 2**

***Task #1: Time Scaling: Compression and Expansion***

%Time Scaling: Compression and expansion

t=-2\*pi:0.001:2\*pi;

a=input('Enter the value of a:')

subplot(2,1,1);

y=sin(2\*pi\*t);

plot(t,y);

grid on;

ylabel('Amplitude -->.');

xlabel('t -->.');

title('Original Signal');

subplot(2,1,2);

y=sin(2\*pi\*a\*t);

plot(t,y);

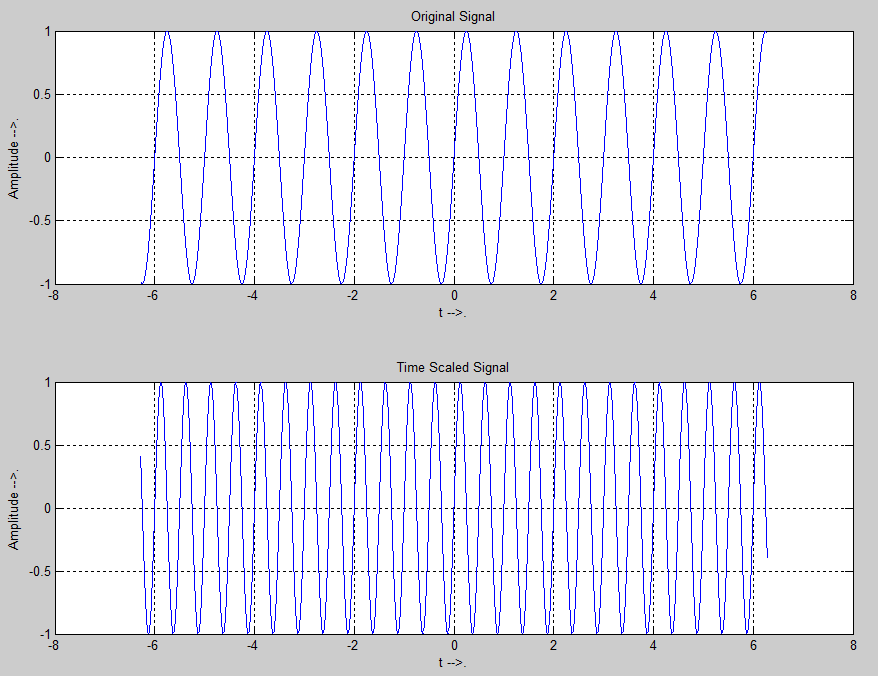
grid on;

ylabel('Amplitude -->.');

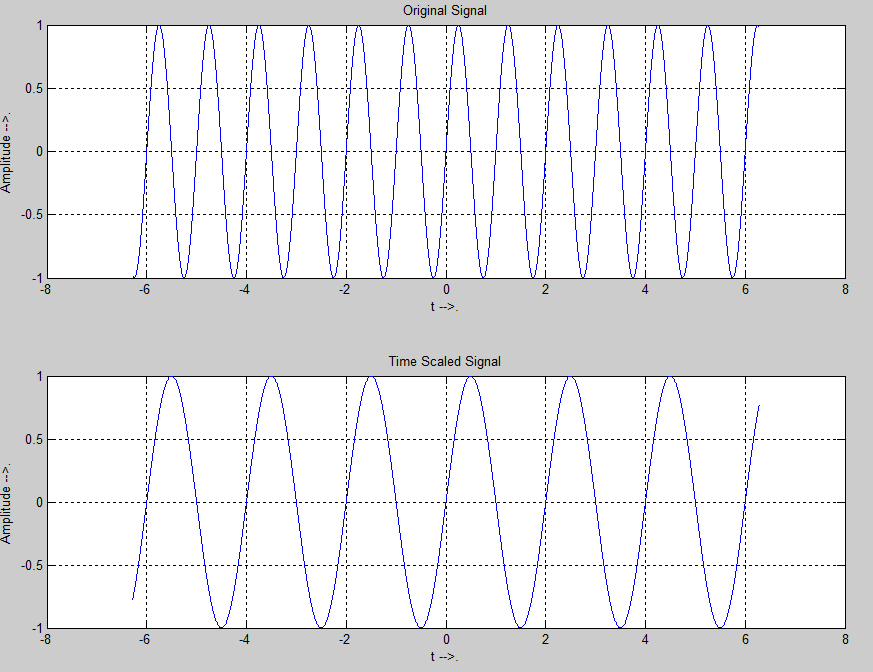
xlabel('t -->.');

title('Time Scaled Signal');

**Sample Run 1 with a = 2: [Compression]**

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**Sample Run 2 with a = 0.5: [Expansion]**

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***Task #2: Time Reversal***

%Time Reversal

t=-2\*pi:0.01:2\*pi;

a=input('Enter the value of a');

subplot(2,1,1);

y=exp(a\*t);

plot(t,y);

grid on;

ylabel('Amplitude -->.');

xlabel('t -->.');

title('Original Signal');

subplot(2,1,2);

y=exp(a\*(-t));

plot(t,y);

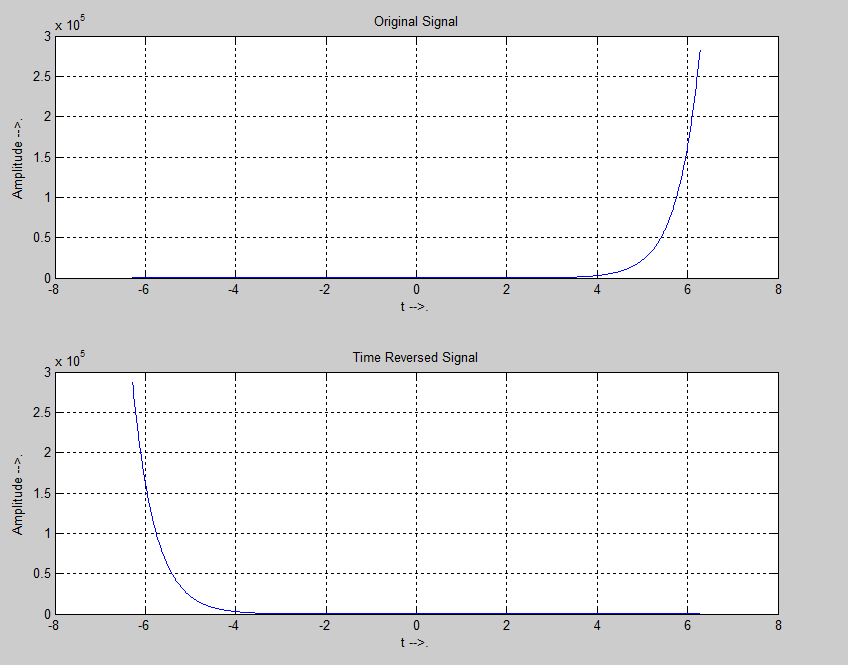
grid on;

ylabel('Amplitude -->.');

xlabel('t -->.');

title('Time Reversed Signal');

Sample Run with a=2[Exponentially growing signal]



Task 3: Amplitude Scaling

%Amplitude Scaling

t=-2\*pi:0.01:2\*pi;

c=input('Enter the value of c');

subplot(2,1,1);

y=sin(2\*pi\*t);

plot(t,y);

grid on;

ylabel('Amplitude -->.');

xlabel('t -->.');

title('Original Signal');

subplot(2,1,2);

y=c\*sin(2\*pi\*t);

plot(t,y);

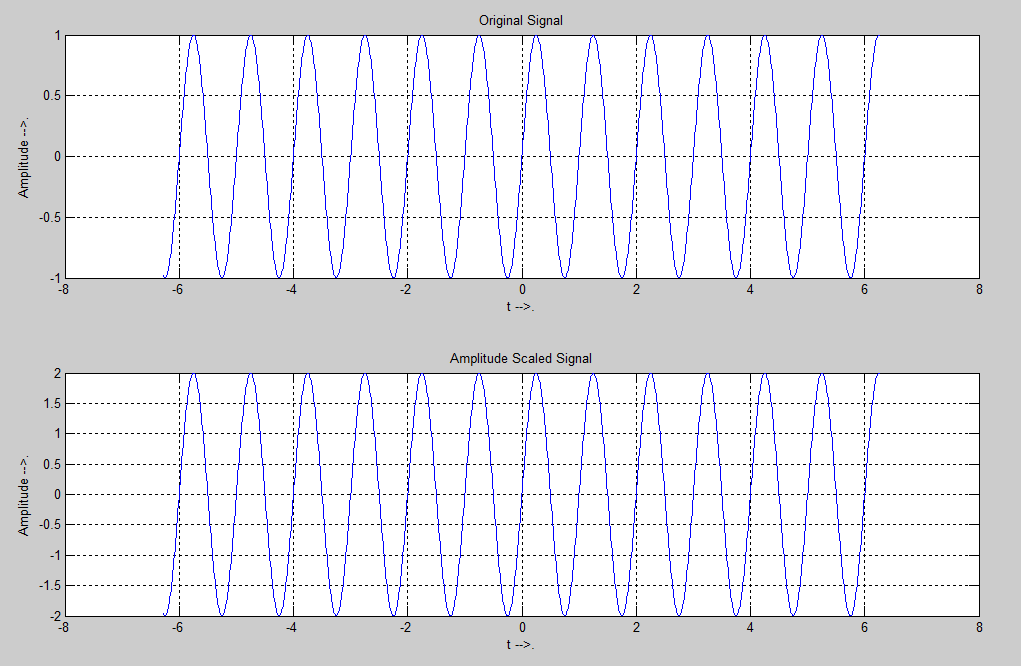
grid on;

ylabel('Amplitude -->.');

xlabel('t -->.');

title('Amplitude Scaled Signal');

Sample Run with c=2



Task 4: Time Differentiation:

syms t;

x = t\*exp(-3\*t)+0.25\*exp(-3\*t);

%x=t.^3;

%x=sin(t);

xd = diff(x,t,1)

xdd = diff(x,t,2)

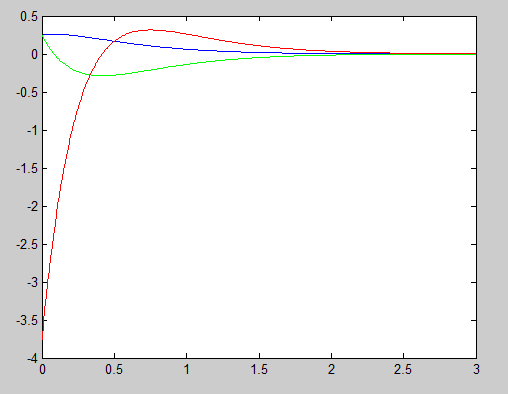
t\_ = 0:0.01:3;

x\_ = subs(x,t,t\_);

xd\_ = subs(xd,t,t\_);

xdd\_ = subs(xdd,t,t\_);

plot(t\_,x\_,'b',t\_,xd\_,'g',t\_,xdd\_,'r')



Task 5: Time Integration:

t = linspace(-7, 7);

func=@(x) x.^2;

y = arrayfun(@(m) integral(func, 0, m), t);

plot(t, y);

