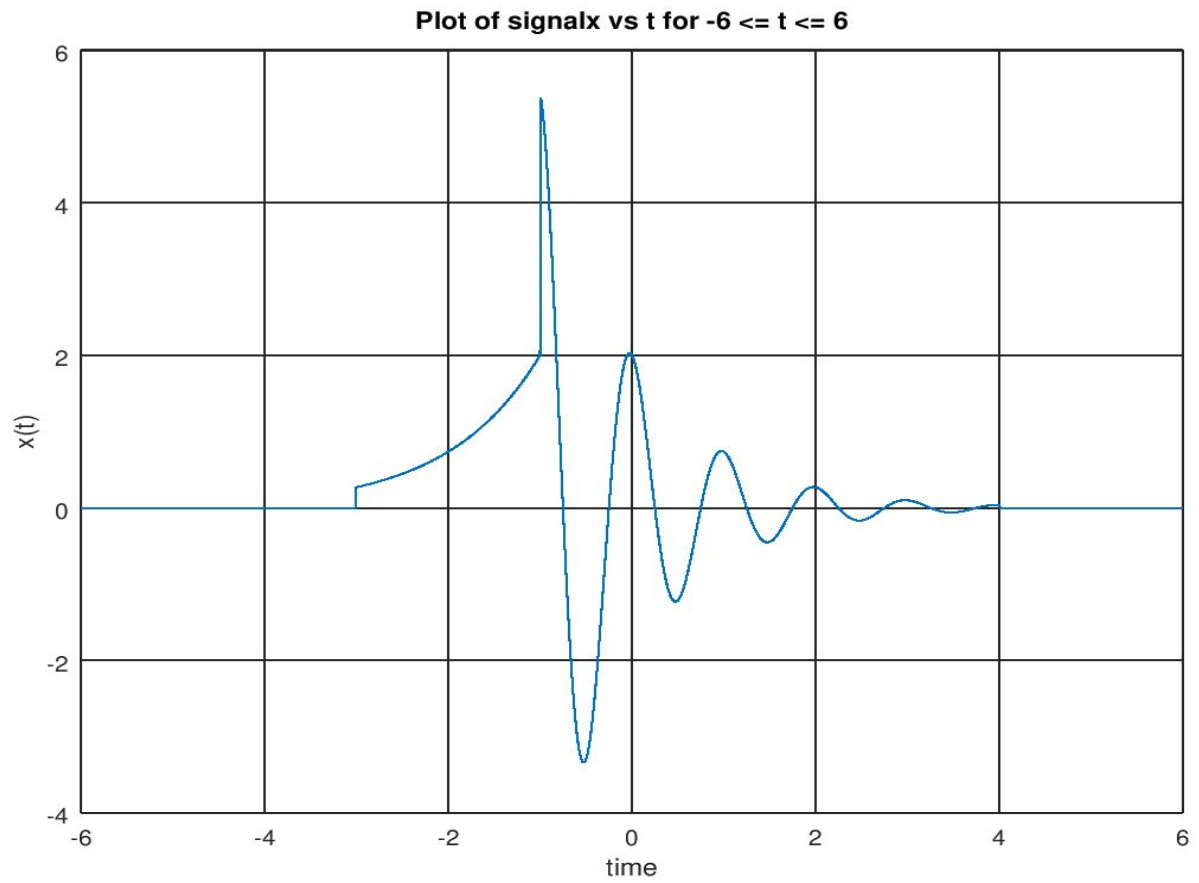# Principle of Communication Lab
Assignment 1
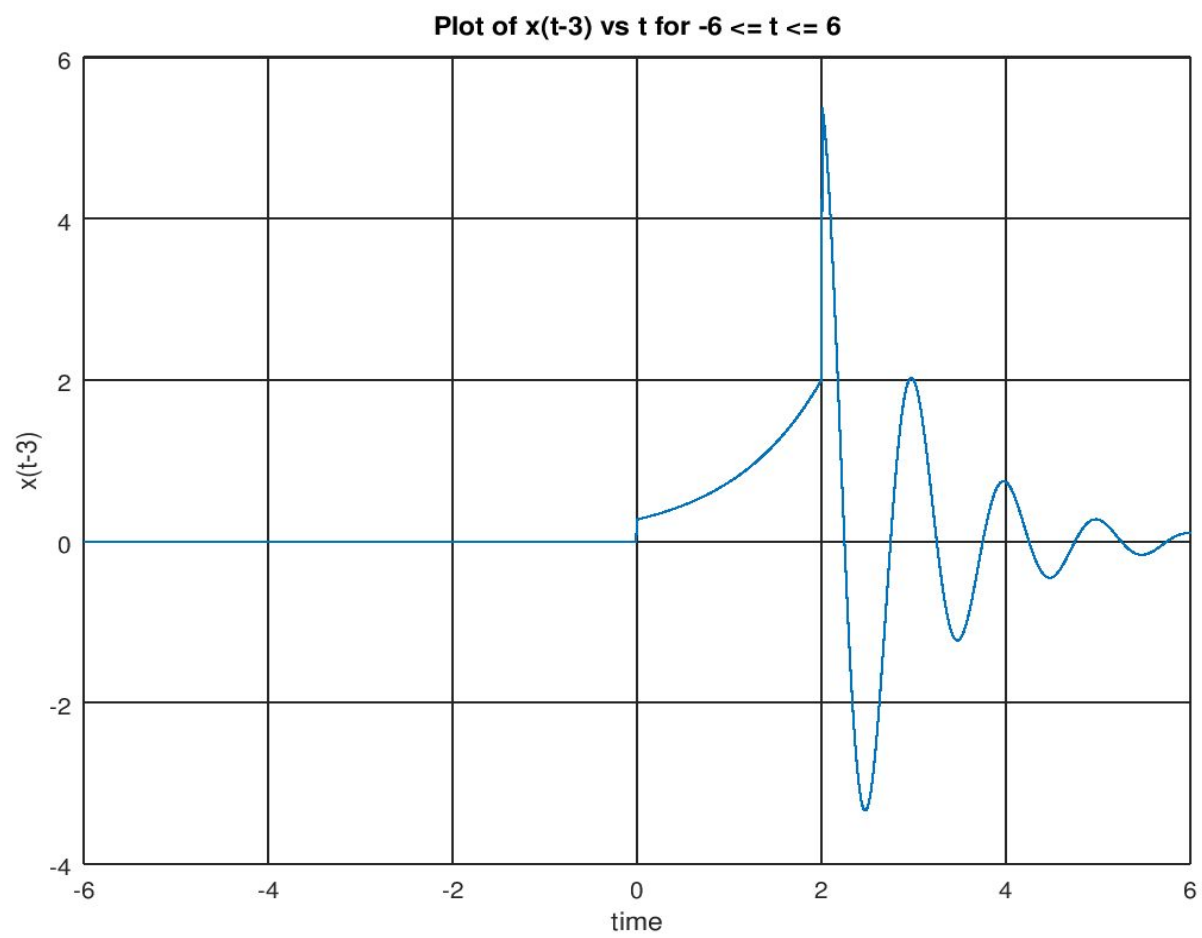
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Question 1 A
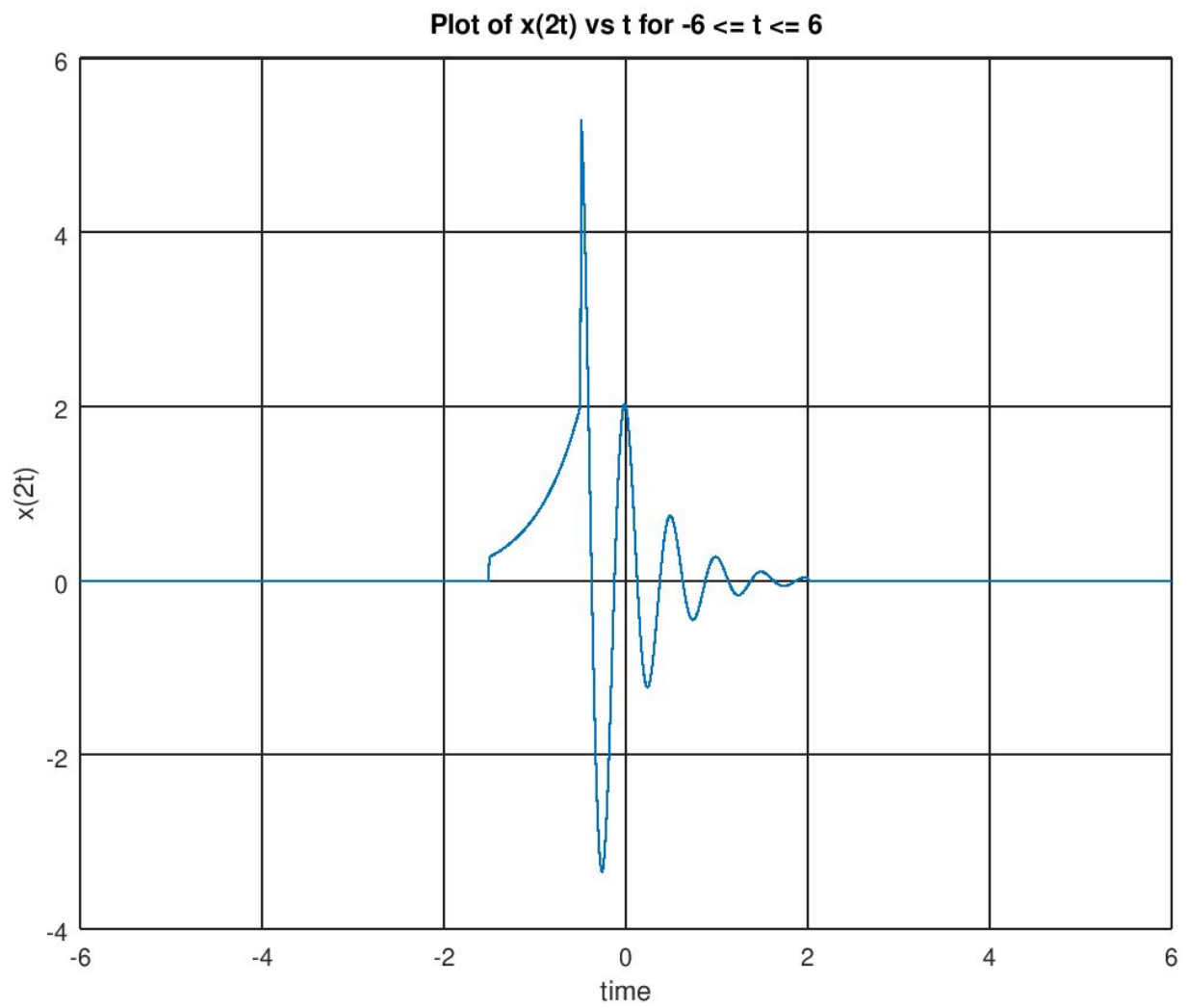

Plot of signalx vs t for -6 <= t <= 6

Question 1 B

Plot of x(t-3) vs t for -6 <= t <= 6

Plot of x(3-t) vs t for -6 <= t <= 6

Plot of x(2t) vs t for -6 <= t <= 6

Convolution of two boxes, 3I [2, 1] and 4I [1,3]

Convolution of the same box twice, I [2, 1]
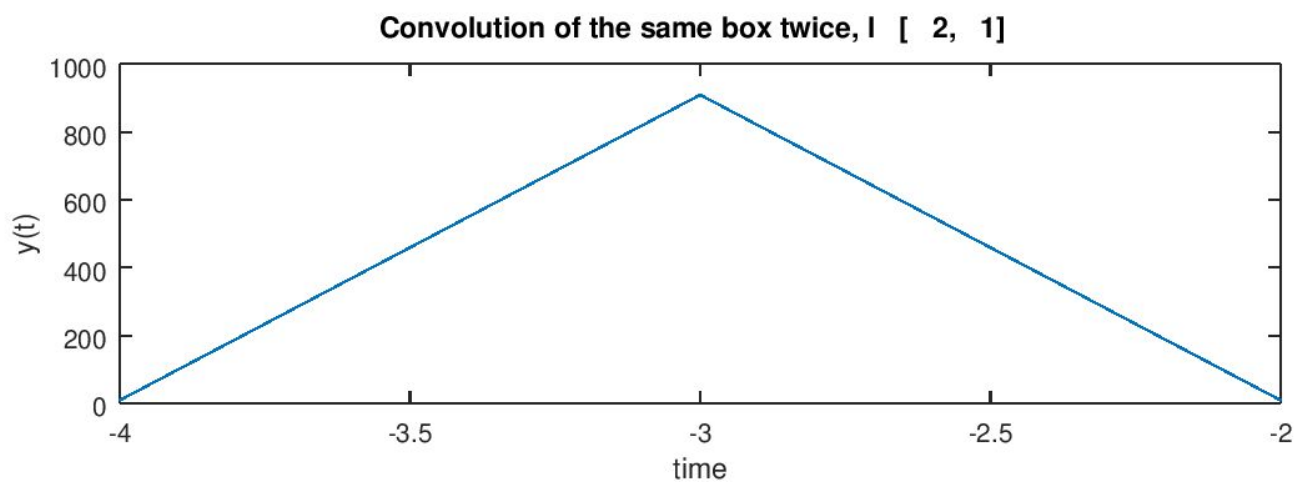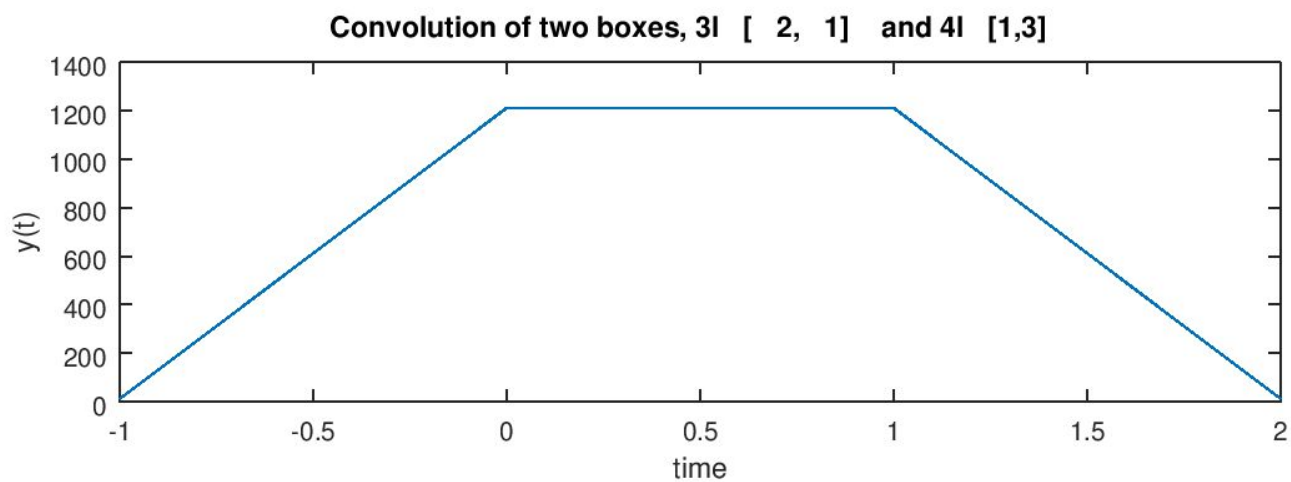
Appendix

Question 1

```matlab
% Question 1, A
function output = signalx(t)

    if(t>=-3 && t<=-1)

        output = 2*(e^(t+1));

    elseif(t>=-1 && t<=4)

        output = 2*(e^(-1*t))*(cos(2*pi*t));

    else

        output = 0;

    endif

endfunction
% Question 1, B
t = [-6 : 0.01: 6];

y = arrayfun(@signalx, t);

plot(t, y);

grid on

title('Plot of signalx vs t for -6 <= t <= 6')
```

```matlab
xlabel('time')

ylabel('x(t)')

pause;


% Question 1, C

t = [-6 : 0.01: 6];

y = arrayfun(@signalx, t-3);

plot(t, y);

grid on

title('Plot of x(t-3) vs t for -6 <= t <= 6')

xlabel('time')

ylabel('x(t-3)')

pause;


% Question 1, D

t = [-6 : 0.01: 6];

y = arrayfun(@signalx, 3-t);

plot(t, y);

grid on

title('Plot of x(3-t) vs t for -6 <= t <= 6')

xlabel('time')
```

```matlab
ylabel('x(3-t)')

pause;



% Question 1, E

t = [-6 : 0.01: 6];

y = arrayfun(@signalx, t*2);

plot(t, y);

grid on

title('Plot of x(2t) vs t for -6 <= t <= 6')

xlabel('time')

ylabel('x(2t)')

pause;
```

Question 2

```matlab
% Question 2, B

function [y,t] = contconv(x1,x2,t1,t2,dt)

    t = (t1+t2):dt:(t1+t2+(length(x2)+length(x1)-2)*dt)

    y = conv(x1,x2)

endfunction

dt=0.01;%sample spacing

s1 = -2:dt:-1; %sampling times over the interval [-2,-1]

s2= 1:dt:3; %sampling times over the interval [1,3]

x1=3*ones(length(s1),1); %samples for first box

x2=4*ones(length(s2),1); %samples for second box

[y,t]= contconv(x1,x2,s1(1),s2(1),dt);

disp(length(y));

disp(length(t));

figure(1);


subplot (2, 1, 1);

plot(t,y);
```

```matlab
title('Convolution of two boxes, 3I[-2,-1] and 4I[1,3]')

xlabel('time')

ylabel('y(t)')




x1=3*ones(length(s1),1); %samples for first box

[y,t] = contconv(x1,x1,s1(1),s1(1),dt)




subplot (2, 1, 2);

plot(t,y);

title(' Convolution of the same box twice, I[-2,-1]')

xlabel('time')

ylabel('y(t)')

pause;
```