Principles of Communication Systems Lab
Lab 1 - August 18th, 2017

IMT2015524

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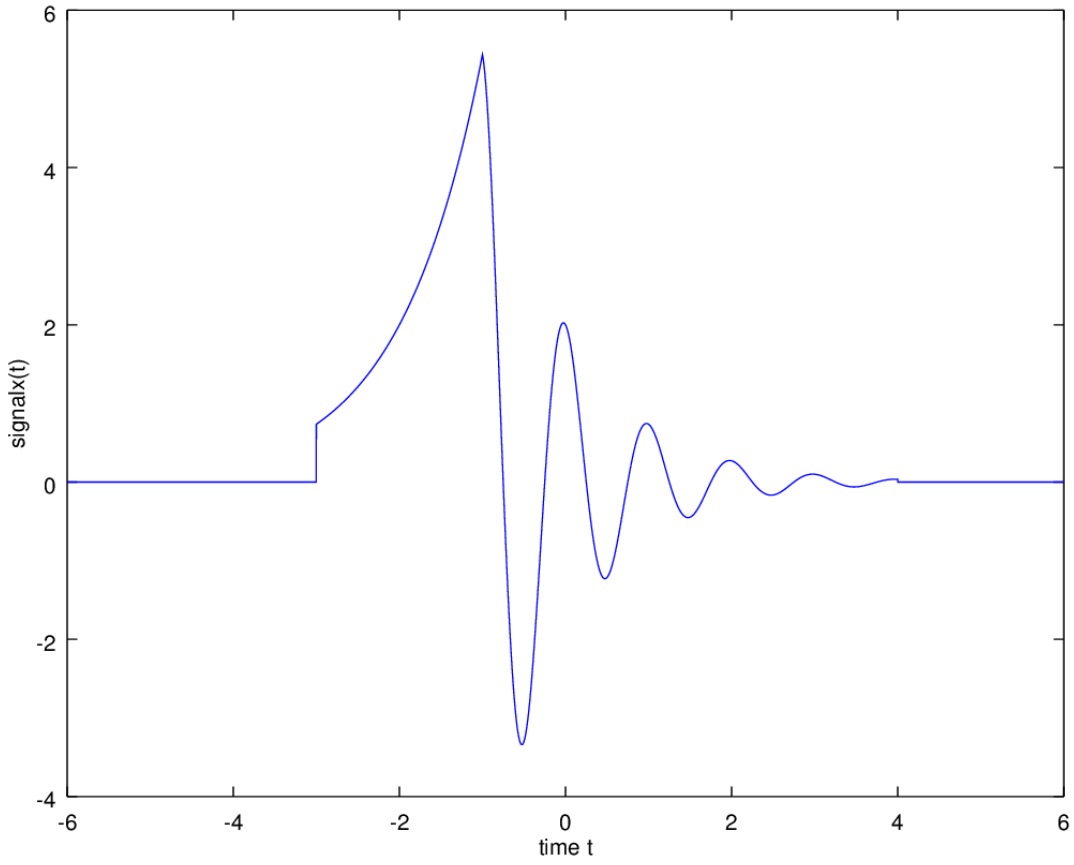
1. Signal x

A ; signalx

```
function retval = signalx (x)
  if -3 <= x & x <= -1
    retval = 2*exp(x+2);
  elseif -1 <= x & x <= 4
    retval = 2*exp(-1*x)*cos(2*pi*x);
  else
    retval = 0;
  end
end
```

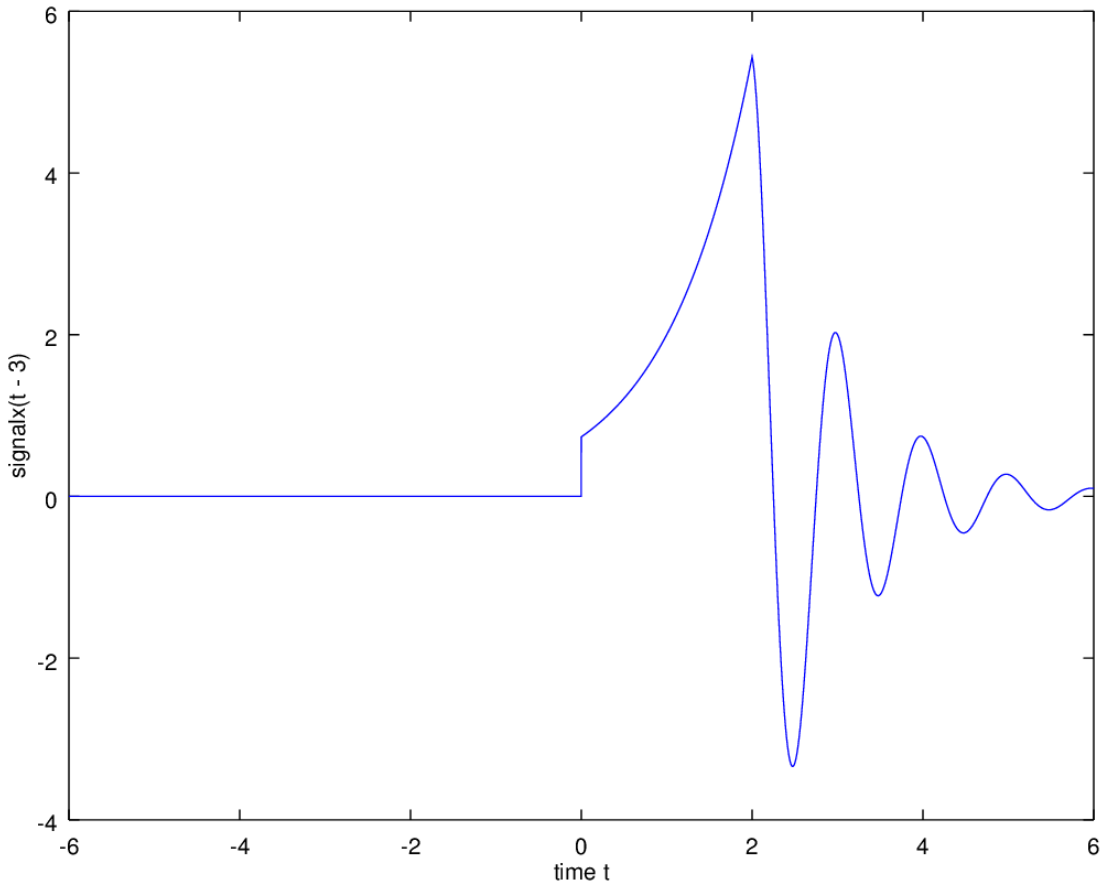
B ; -6 : 6

```
t = -6:0.001:6;
plot(t, arrayfun(@signalx, t));
```



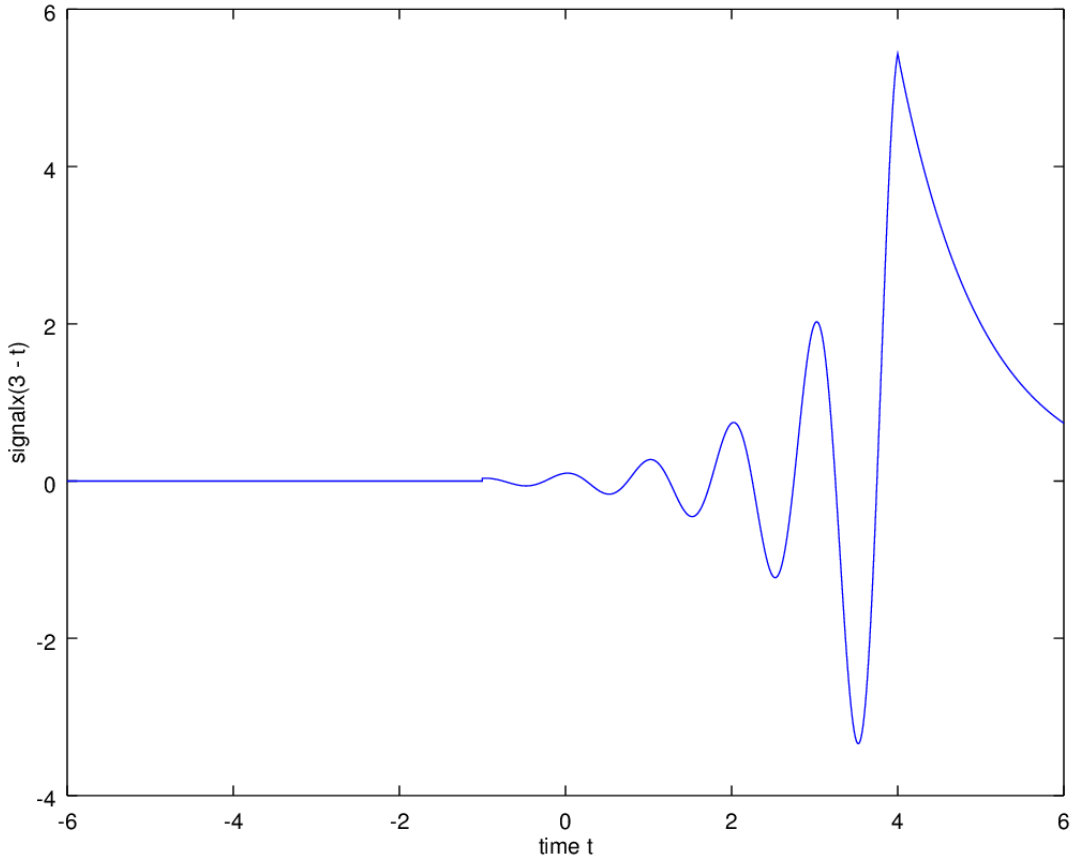
C ; t - 3

```
t = -6:0.001:6;
plot(t, arrayfun(@signalx, t - 3));
xlabel ("time t");
ylabel ("signalx(t - 3)");
```



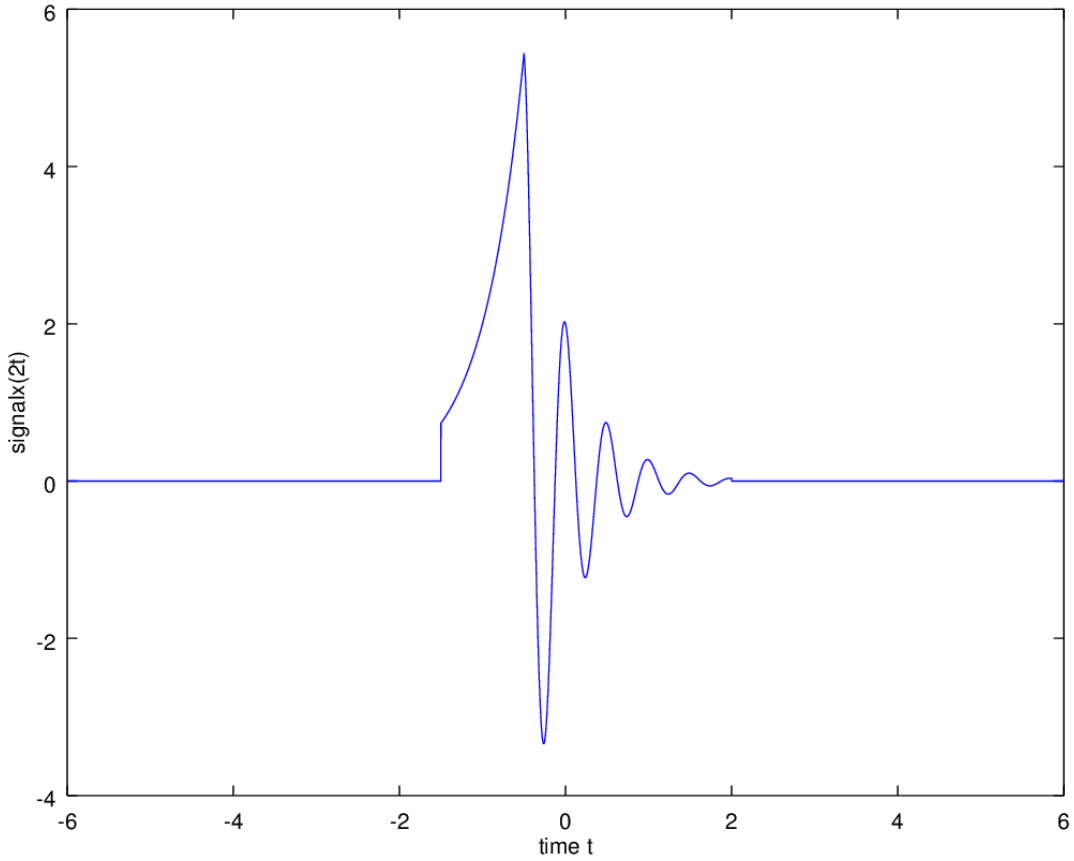
D ; 3 - t

```
t = -6:0.001:6;
plot(t, arrayfun(@signalx, 3 - t));
xlabel ("time t");
ylabel ("signalx(3 - t)");
```



E ; 2t

```
t = -6:0.001:6;
plot(t, arrayfun(@signalx,  2*t));
xlabel ("time t");
ylabel ("signalx(2t)");
```



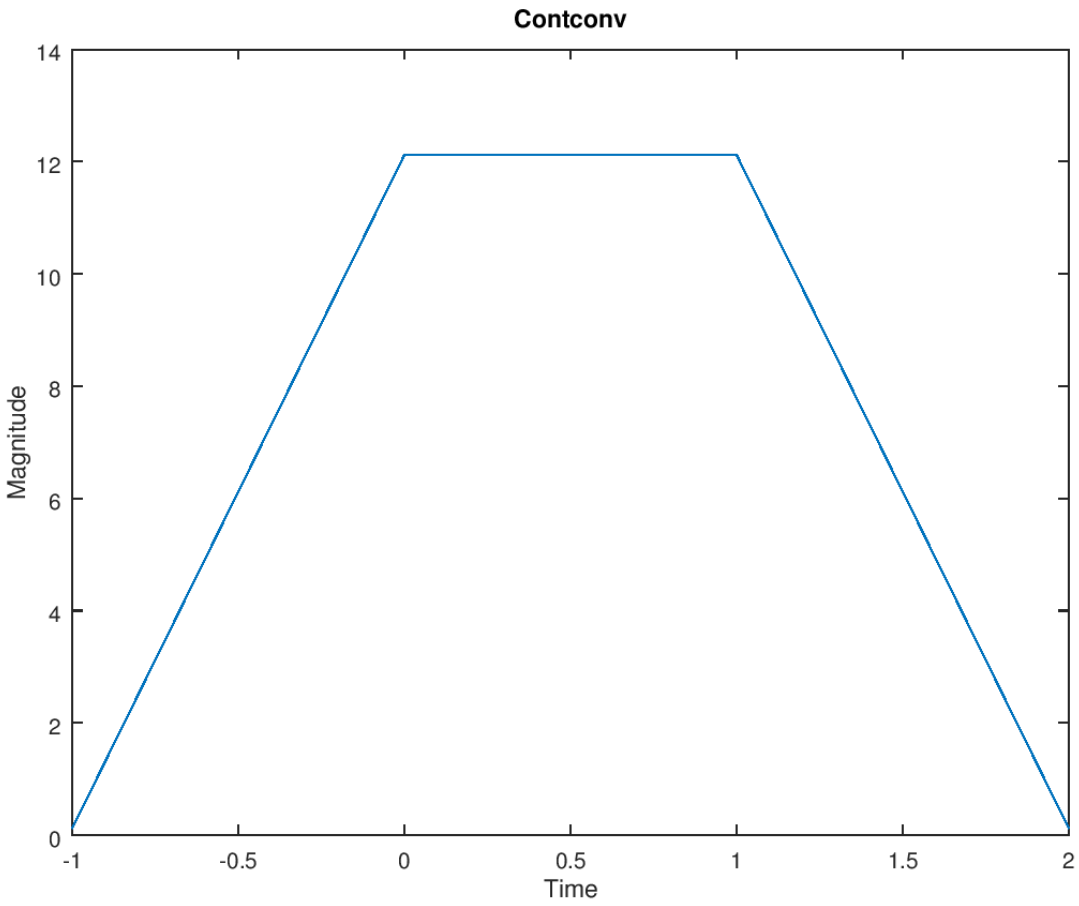
2. contconv

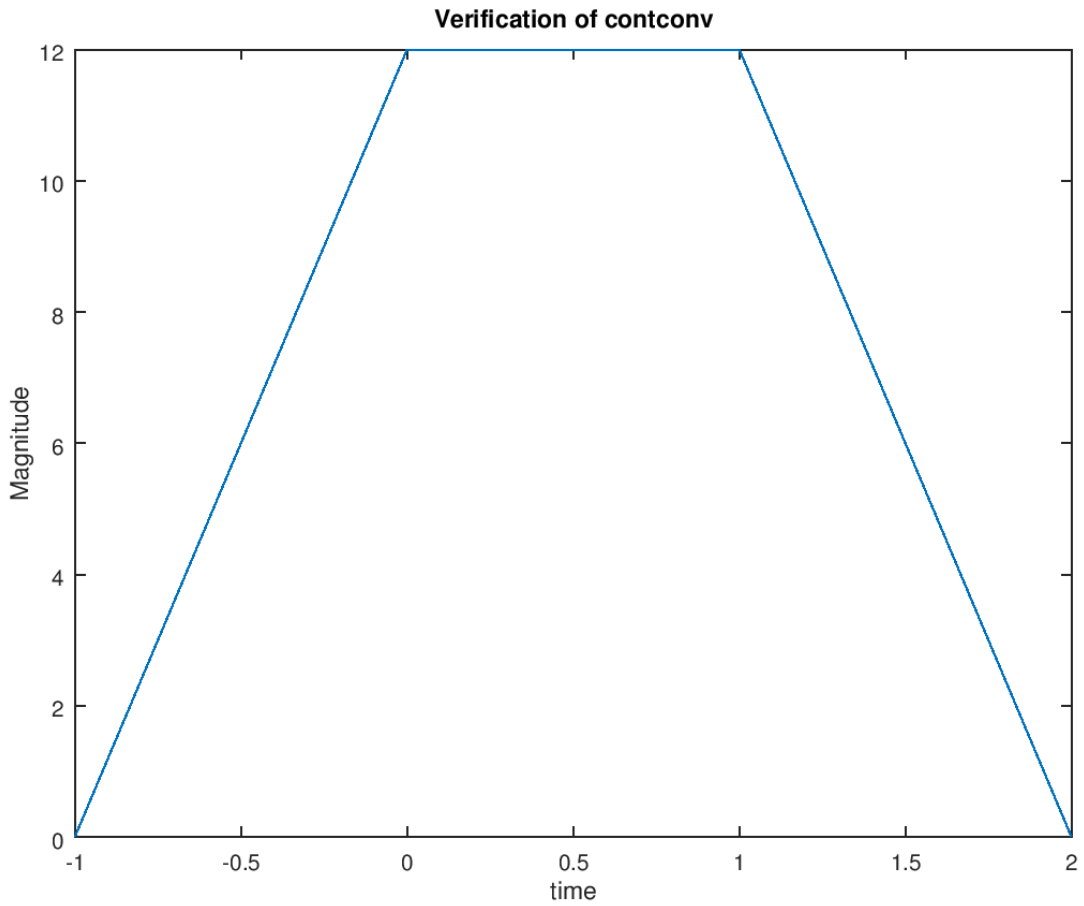
Contconv Function

```
function [time, convolution] = contconv (x1, x2, t1, t2, dt)
  Tstart1 = t1;
  Tstop1 = t1 + length(x1)*dt - dt;

  Tstart2 = t2;
  Tstop2 = t2 + length(x2)*dt - dt;

  startTime = Tstart1 + Tstart2;
  endTime = Tstop1 + Tstop2;

  time = startTime:dt:endTime;

  convolution = conv(x1,x2).*dt;
endfunction
```

Script to plot

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



Verification:

```
dt = 0.1;
time = -2:dt:3;
t1 = (time>-2) - (time>-1);
t2 = (time>1) - (time>3);
x1 = t1.*3;
x2 = t2.*4;
t1
x1
[time, convolution] = contconv(x1, x2, t1(1), t2(1), dt);
plot(time, convolution);
```