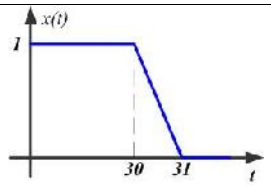
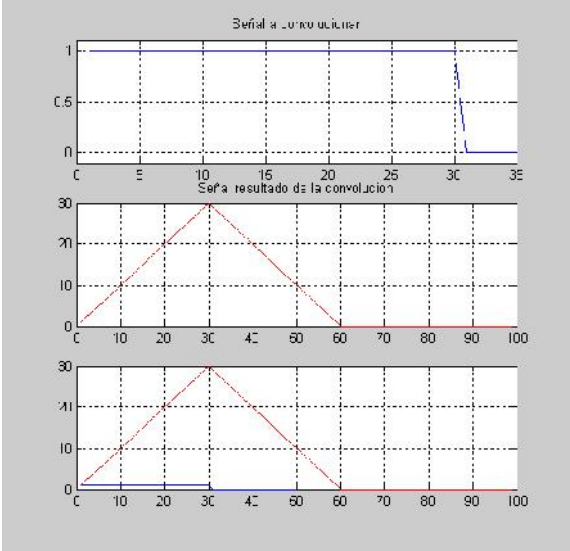
CONVOLUCION CON MATLAB

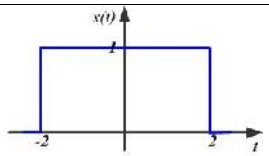
Generar la señal y convolucionar consigo misma



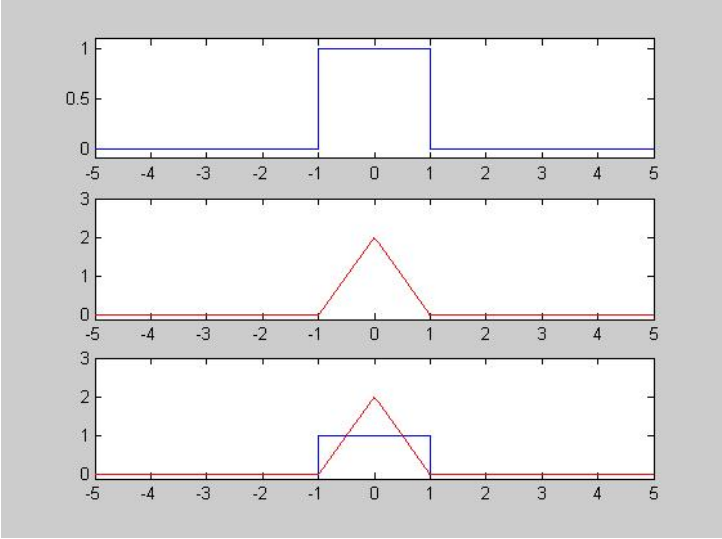

```
>>n=[1:50];
>>p=[ones(1,30) zeros(1,20)];
>>k=[1:99];
>>s1=conv(p,p);
>>subplot(3,1,1)
>>plot(n,p, 'b ')
>>title('Señal a convolucionar')
>>grid
>>subplot(3,1,2)
>>plot(k,s1, 'r ')
>>title('Señal resultado de la convolucion')
>>grid
>>subplot(3,1,3)
>>plot(n,p, '- ')
>>hold on
>>plot(k,s1, 'r ')
>>grid
```



Calcular la convolucion de un pulso centrado en $t=0$, de amplitud 1 y que se extienda desde $t=-1$ hasta $t=1$

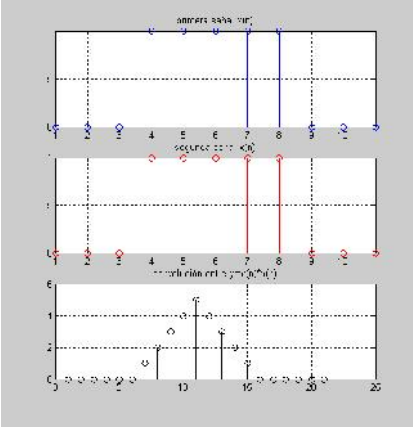



```
>> t=-5:0.01:5;
>> L=length(t);
>> p1=find(t==-1);
>> p2=find(t==1);
>> x=zeros(1,L);
>> x(p1:p2)=1;
>> R=-5:0.005:5;
>> convo=conv(x,x);
>> subplot(3,1,1)
>> plot(t,x)
>> subplot(3,1,2)
>> plot(R,convo/100, 'r' )
>> subplot(3,1,3)
>> plot(t,x)
>> hold on;
>> plot(R,convo/100, 'r' )
```



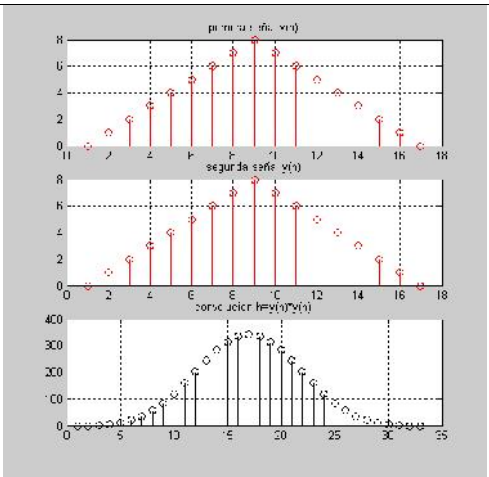
Convolucionar la secuencia consigo misma $x[n]=[0,\ 0,\ 0,\ 1,\ 1,\ 1,\ 1,\ 1,\ 0,\ 0,\ 0]$

```
>>x = [0 0 0 1 1 1 1 1 0 0 0] ;
>>y = conv ( x , x ) ;
>>subplot(311);
>>stem(x, 'ob'); grid;
>>title('primera señal x(n)')
>>subplot(312);
>>stem(x, 'or') ;
>>title('segunda señal x(n)')
>>grid,
>>subplot(313);
>>stem (y, 'ok') ;
>>title('convolución entre y=x(n)*x(n)')
>>grid
```



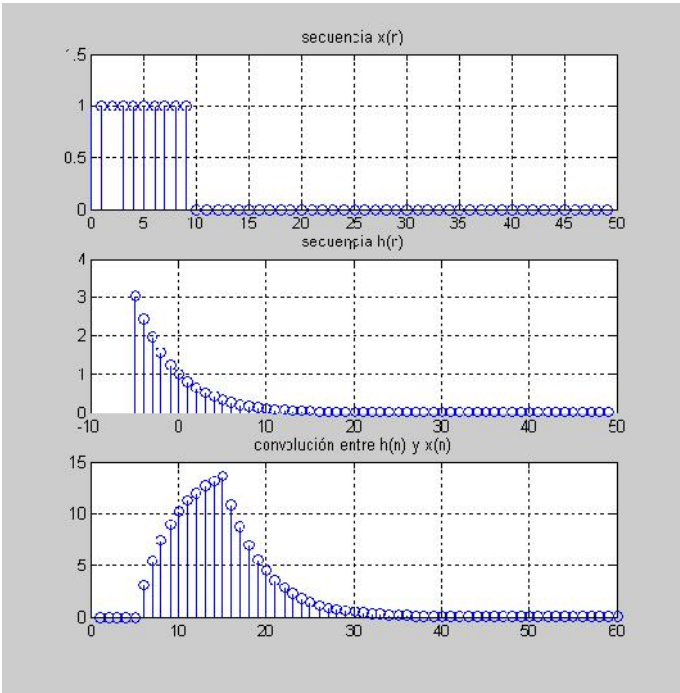
Covolucionar la secuencia consigo misma $x[n]=[0,\ 1,\ 2,\ 3,\ 4,\ 5,\ 6,\ 7,\ 8,\ 7,\ 6,\ 5,\ 4,\ 3,\ 2,\ 1,\ 0]$

```
>>y=[[0:8] [7:-1:0]];
>>figure(2);
>>z = conv ( y , y ) ;
>>subplot(311);
>>stem(y, 'or') ;
>>title('primera señal y(n)')
>>grid,...
>>subplot(312);
>>stem(y, 'or') ;
>>title('segunda señal y(n)')
>>grid,
>>subplot(313);
>>stem(z, 'ok') ; gris;
>>title('convolucion h=y(n)*y(n)')
```



Sea el pulso rectangular $x[n]=u[n]-u[n-10]$ la entrada a un sistema cuya respuesta al impulso es $h[n]=(0.8)^n u[n]$ *h(n),* encontrar la salida $y[n]=x[n]*h[n]$.

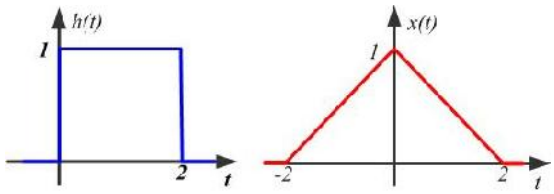
```
>>A1=zeros(1,5);
>>A2=ones(1,10);
>>A3=zeros(1,40);
>>X=[A1 A2 A3];
>>n=-5:49;
>>h=(0.8).^n;
>>y=conv(X,h);
>>subplot(311)
>>stem(n,X);grid;
>>axis([0 50 0 1.5])
>>title('secuencia x(n)')
>>xlabel('n')
>>subplot(312)
>>stem(n,h)
>>title('secuencia h(n)')
>>grid
>>subplot(313)
>>stem(y)
>>title('convolución entre h(n) y x(n)')
>>grid
>>axis([0 60 0 15])
```



TRABAJO PRÁCTICO
CONVOLUCION CON BATLAB

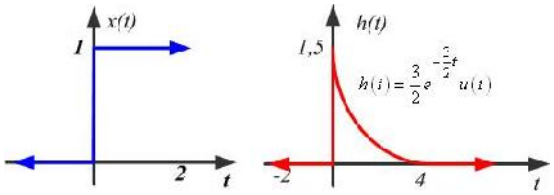
Representar gráficamente la convolucion de las siguientes señales

1



$$y(t)=h(t)*x(t)$$

2



$$y(t)=x(t)*h(t)$$

Representar gráficamente la convolucion de las siguientes señales

1 $y(t)=x(t)*h(t) \quad si \quad h(t)=\frac{3}{2}e^{-\frac{3}{2}t}u(t) \quad \wedge \quad x(t)=u(t)-u(t-2)$

2 $y(t)=x(t)*h(t) \quad si \quad h(t)=\frac{3}{2}e^{-\frac{3}{2}t}u(t) \quad \wedge \quad x(t)=\cos(2®t)$

3 $y[n]=x[n]*h[n] \quad si \quad h[n]=3\left(\frac{2}{3}\right)^{n}\{u[n]-u[n-5]\} \quad \wedge \quad x[n]=\{u[n+3]-u[n-4]\}$

4 $y[n]=x[n]*h[n] \quad si \quad h[n]=(n+2)\{u[n]-u[n-5]\} \quad \wedge \quad x[n]=n^{2}\{u[n]-u[n-3]\}$