CONSIGNA DE LA CLASE #A PUNTO 1

$$h[m] = 1/3 \cdot (\delta[m] + \delta[m-1] + \delta[m-2] = \{\underline{1/3}, 1/3, 1/3\}$$

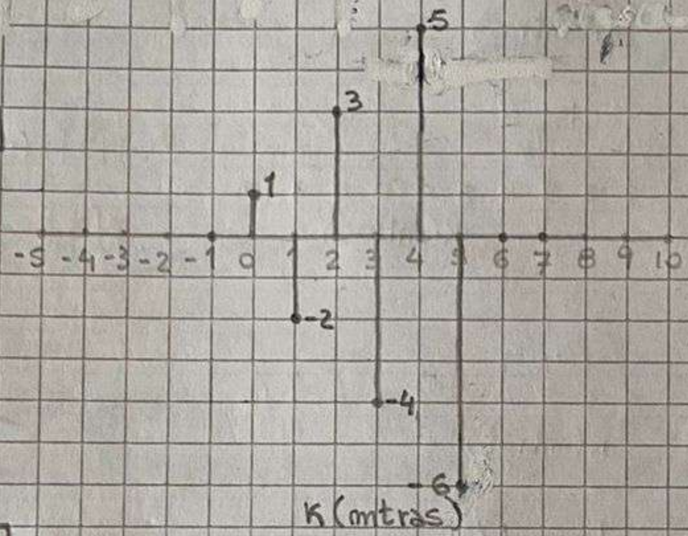
a) $x[m] = \{\underline{1}, -2, 3, -4, 5, -6\}$

m	x[m]	h[m]
0	1	1/3
1	-2	1/3
2	3	1/3
3	-4	0
4	5	0
5	-6	0

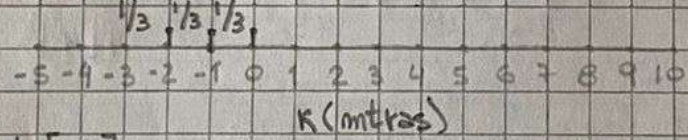
$x_i + h_i = 0 + 0 = 0$
$x_f + h_f = 5 + 2 = 7$
y[m] TENDRÁ 8 MUESTRAS

$L = L_x + L_h - 1 = 6 + 3 - 1 = 8$ MUESTRAS

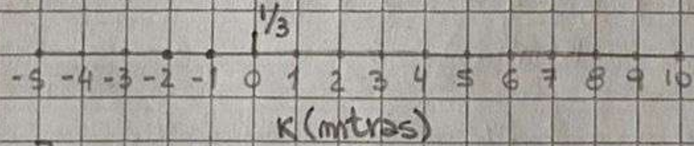
x[K]



h[-K]

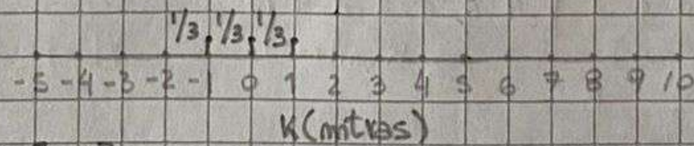


x[K]·h[-K]

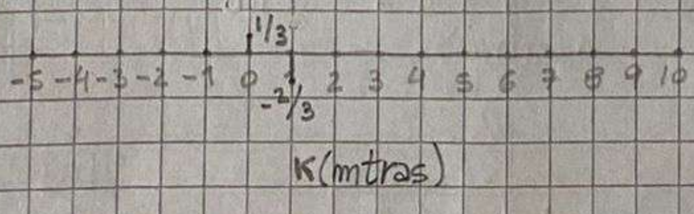


$\therefore\ y[0] = 1/3 \cdot 1 = 1/3$

h[1-K]

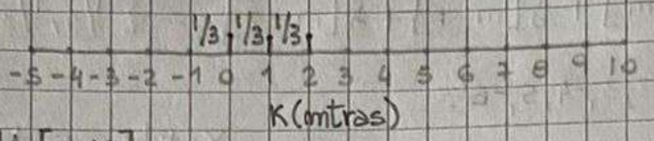


x[K] h[1-K]

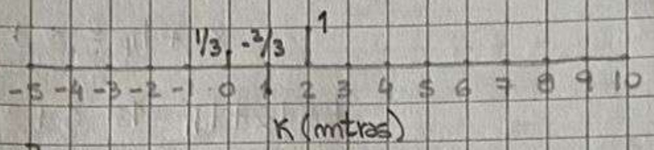


$\therefore\ y[1] = 1 \cdot 1/3 + (-2) \cdot 1/3 = -1/3$

$h[2-k]$



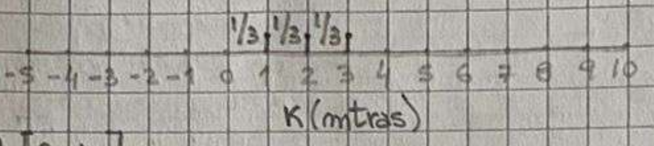
$x[k]h[2-k]$



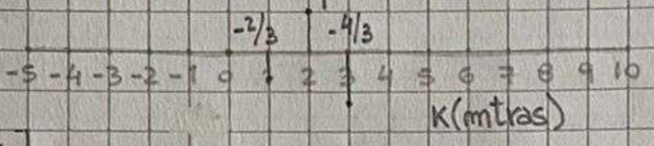
$\therefore\ y[2] = 1 \cdot 1/3 + (-2) \cdot 1/3 + 3 \cdot 1/3$

$y[2] = 1/3 - 2/3 + 3/3 = 2/3$

$h[3-k]$



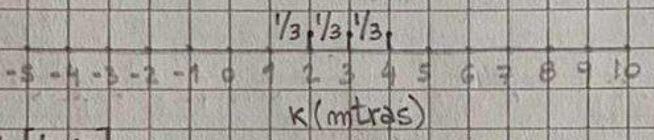
$x[k]h[3-k]$



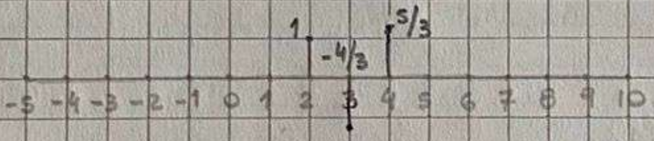
$\therefore\ y[3] = (-2)1/3 + 3 \cdot 1/3 + (-4)1/3$

$y[3] = -2/3 + 3/3 - 4/3 = -1$

$h[4-k]$



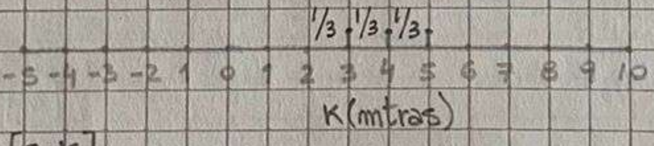
$x[k]h[4-k]$



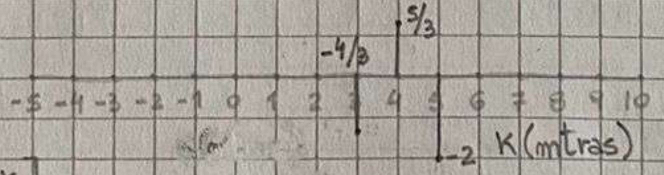
$\therefore\ y[4] = 3 \cdot 1/3 + (-4)1/3 + 5 \cdot 1/3$

$y[4] = 3/3 - 4/3 + 5/3 = 4/3$

$h[5-k]$



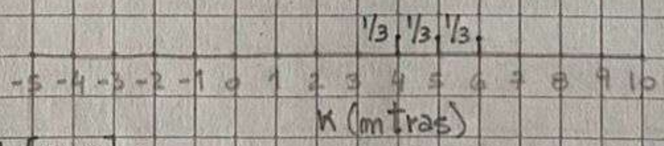
$x[k]h[5-k]$



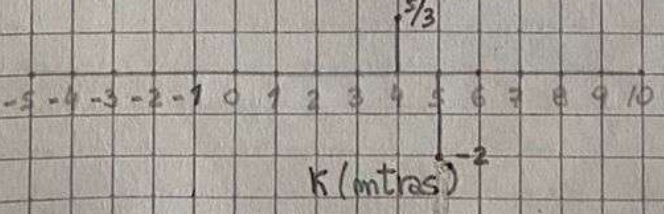
$\therefore\ y[5] = (-4)1/3 + 5 \cdot 1/3 + (-6)1/3$

$y[5] = -4/3 + 5/3 - 6/3 = -5/3$

$h[6-k]$



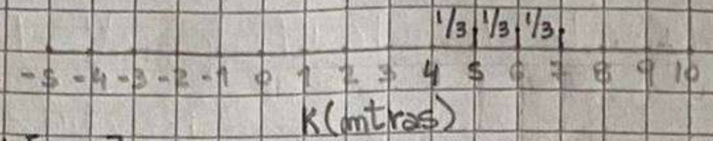
$x[k]h[6-k]$



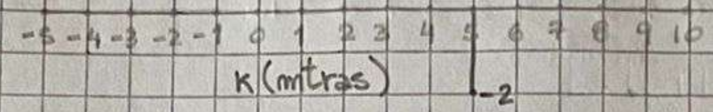
$\therefore\ y[6] = 5 \cdot 1/3 + (-6)1/3$

$y[6] = 5/3 - 6/3 = -1/3$

$h[7-k]$



$x[k]h[7-k]$



$\therefore y[7] = (-6)\,{}^{1}/_{3} = -2$

$y[-1] = 0 \wedge y[8] = 0 \quad \therefore y[m] = \{\underline{1/3}, -1/3, 2/3, -1, -4/3, -5/3, -1/3, -2\}$

$$y[m] = \begin{cases} 0, & m < 0 \\ [1/3, -1/3, 2/3, -1, 4/3, -5/3, -1/3, -2], & m \in [0,7] \\ 0, & m > 7 \end{cases}$$

b) $x[m] = \cos(\pi/4 \cdot m) \cdot u[m]$

$2\cancel{\pi}\,\Omega_0 = \cancel{\pi}/4 \rightarrow \Omega_0 = 1/8 = K/N_0$

PARA $K = 1$, $N_0 = 8$ → NECESITO 1 CICLO DE LA SEÑAL CONTINUA PARA TENER UN PERIODO DE 8 MUESTRAS DE MI SEÑAL DISCRETA.

PARA $m = 0$

$x[0] = \cos(\pi/4 \cdot 0) = \cos(0) = 1$

$x[1] = \cos(\pi/4) = \cos(45^\circ) = \sqrt{2}/2$

$x[2] = \cos(\pi/\cancel{4}_2 \cdot \cancel{2}) = \cos(90^\circ) = 0$

$x[3] = \cos(3\pi/4) = \cos(135^\circ) = -\sqrt{2}/2$

$x[4] = \cos(\pi/\cancel{4} \cdot \cancel{4}) = \cos(180^\circ) = -1$

$x[5] = \cos(5\pi/4) = \cos(225^\circ) = -\sqrt{2}/2$

$x[6] = \cos(\pi/\cancel{4}_2 \cdot \cancel{6}^3) = \cos(270^\circ) = 0$

$x[7] = \cos(\pi/4 \cdot 7) = \cos(315^\circ) = \sqrt{2}/2$

$x[8] = \cos(\pi/\cancel{4} \cdot \cancel{8}^2) = \cos(360^\circ) = 1$

VALORES A CONSIDERAR PARA CALCULAR LA CONVOLUCIÓN

$x_i + h_i = 0 + 0 = 0$

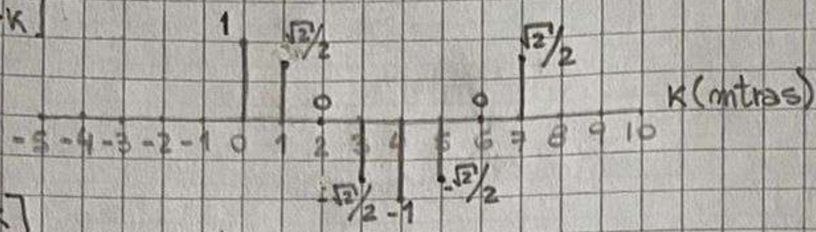
$x_f + h_f = 7 + 2 = 9$

$y[m]$ TENDRÁ 10 MUESTRAS

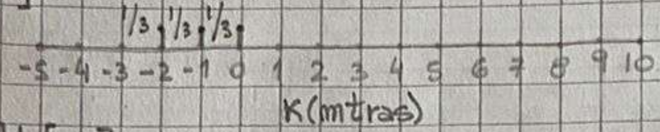
$L = L_x + L_h - 1 = 9 + 2 - 1$

$L = 10$ MUESTRAS

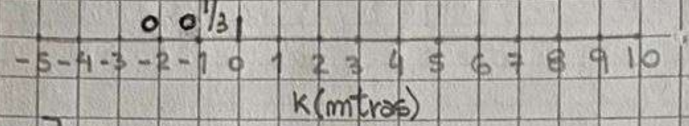
$x[+k]$



$h[-k]$

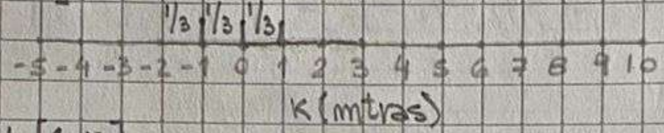


$x[k]h[-k]$

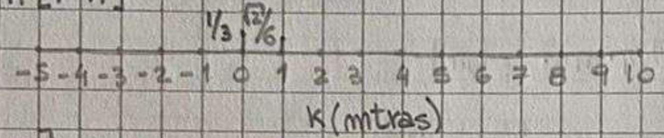


$\therefore y[0] = 1/3$

$h[1-k]$



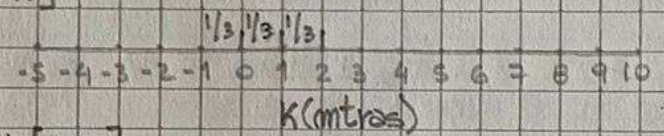
$x[k]h[1-k]$



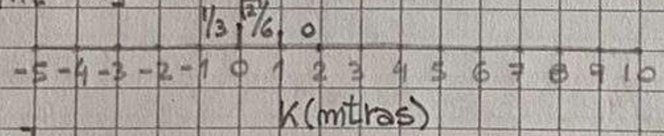
$\therefore y[1] = 1 \cdot 1/3 + \sqrt{2}/2 \cdot 1/3$

$y[1] = 0,569$

$h[2-k]$

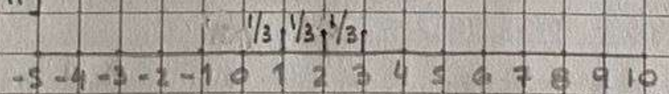


$x[k]h[2-k]$

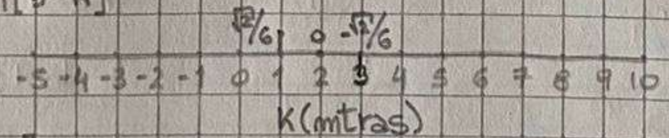


$\therefore y[2] = y[1] = 0,569$

$h[3-k]$



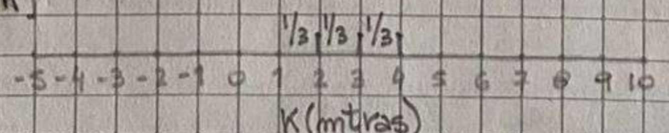
$x[k]h[3-k]$



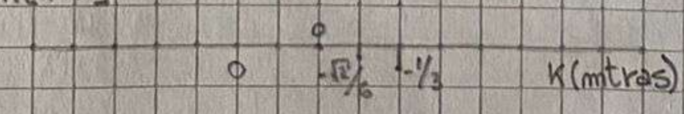
$\therefore y[3] = \sqrt{2}/2 \cdot 1/3 + (-\sqrt{2}/2) 1/3$

$y[3] = 0$

$h[4-k]$



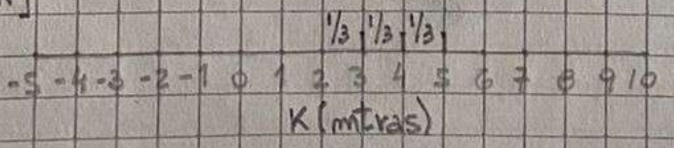
$x[k]h[4-k]$



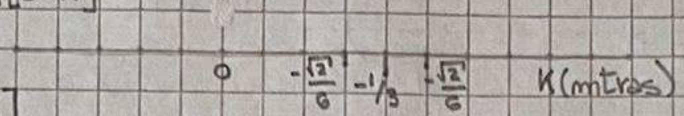
$\therefore y[4] = (-\sqrt{2}/2) 1/3 + (-1) 1/3$

$y[4] = -0,569$

$h[5-k]$



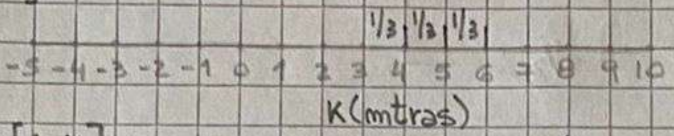
$x[k]h[5-k]$



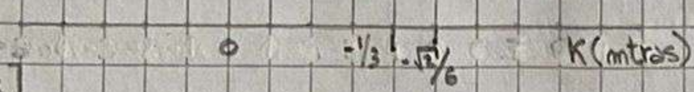
$\therefore y[5] = \left(-\frac{\sqrt{2}}{2}\right)1/3 + (-1)1/3 + \left(-\frac{\sqrt{2}}{2}\right)1/3$

$y[5] = -0{,}805$

$h[6-k]$



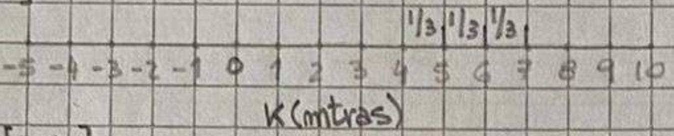
$x[k]h[6-k]$



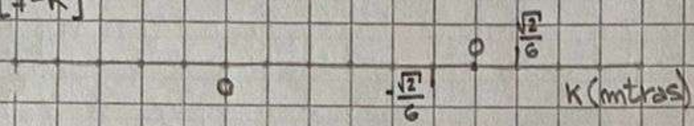
$\therefore y[6] = (-1)1/3 + (-\sqrt{2}/2)1/3$

$y[6] = -0{,}569$

$h[7-k]$



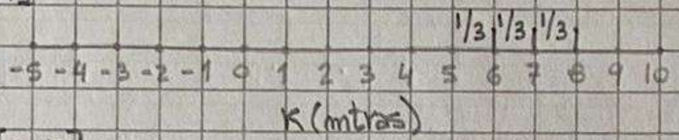
$x[k]h[7-k]$



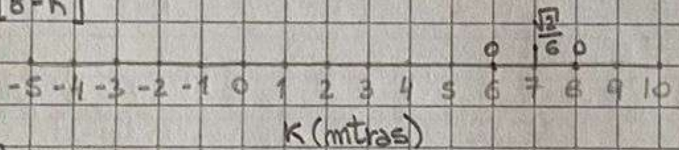
$\therefore y[7] = \left(-\frac{\sqrt{2}}{2}\right)1/3 + \sqrt{2}/2 \cdot 1/3$

$y[7] = 0$

$h[8-k]$

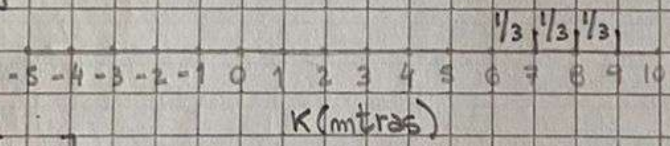


$x[k]h[8-k]$

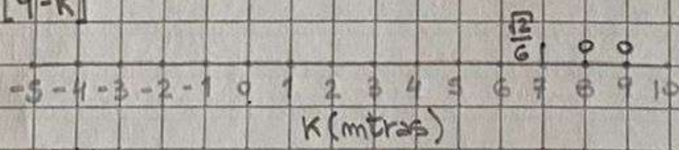


$\therefore y[8] = 0{,}236$

$h[9-k]$



$x[k]h[9-k]$



$\therefore y[9] = 0{,}236$

$y[m] = \{1/3; 0{,}569; 0{,}569; 0; -0{,}569; -0{,}805; -0{,}569; 0; 0{,}236; 0{,}236\}$

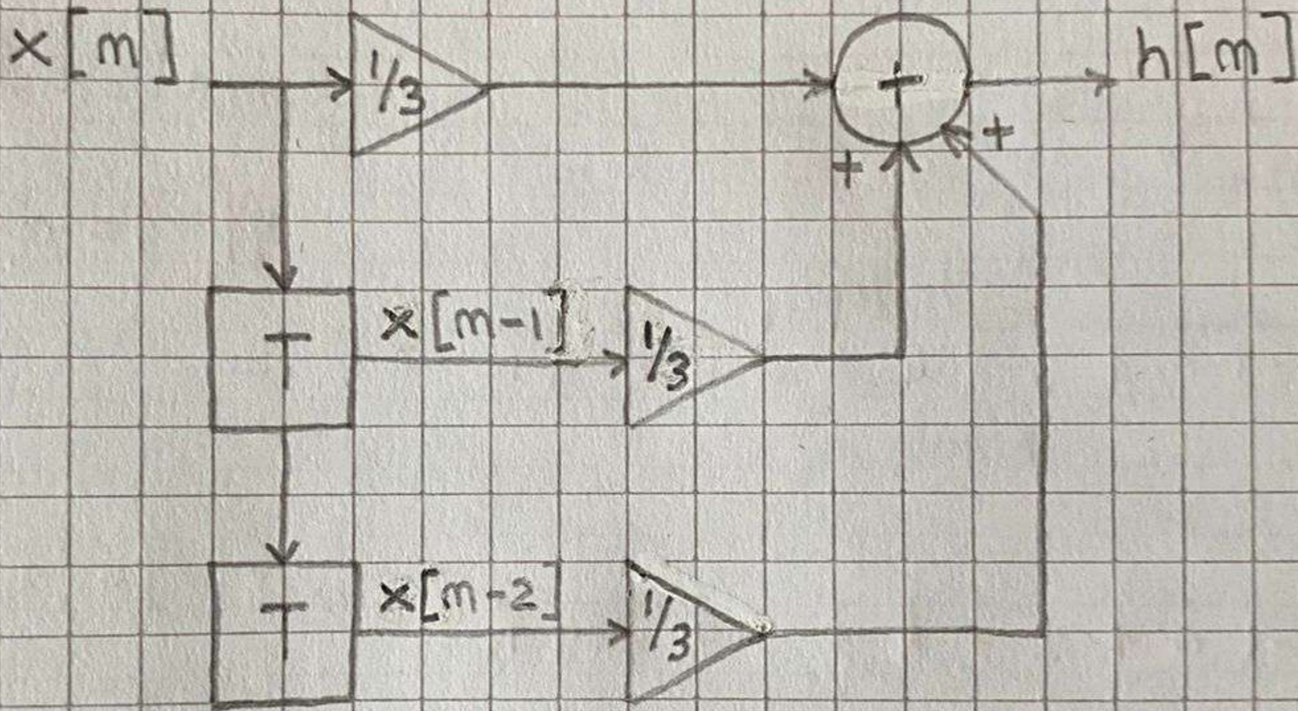
CONSIGNA DE LA CLASE # A PUNTO 3

$h[m] = 1/3 \cdot (\delta[m] + \delta[m-1] + \delta[m-2])$

$y[m] = x[m] * h[m] = x[m] * 1/3 \cdot (\delta[m] + \delta[m-1] + \delta[m-2])$

RECORDANDO LA PROP. DE LA CONVOLUCIÓN : $x(t) * A \cdot \delta(t-t_0) = A \cdot x(t-t_0)$

$y[m] = 1/3 \cdot (x[m] + x[m-1] + x[m-2])$


x[m]
1/3
+
h[m]
+
+
T
x[m-1]
1/3
T
x[m-2]
1/3

TareaA_Clase7_Punto1

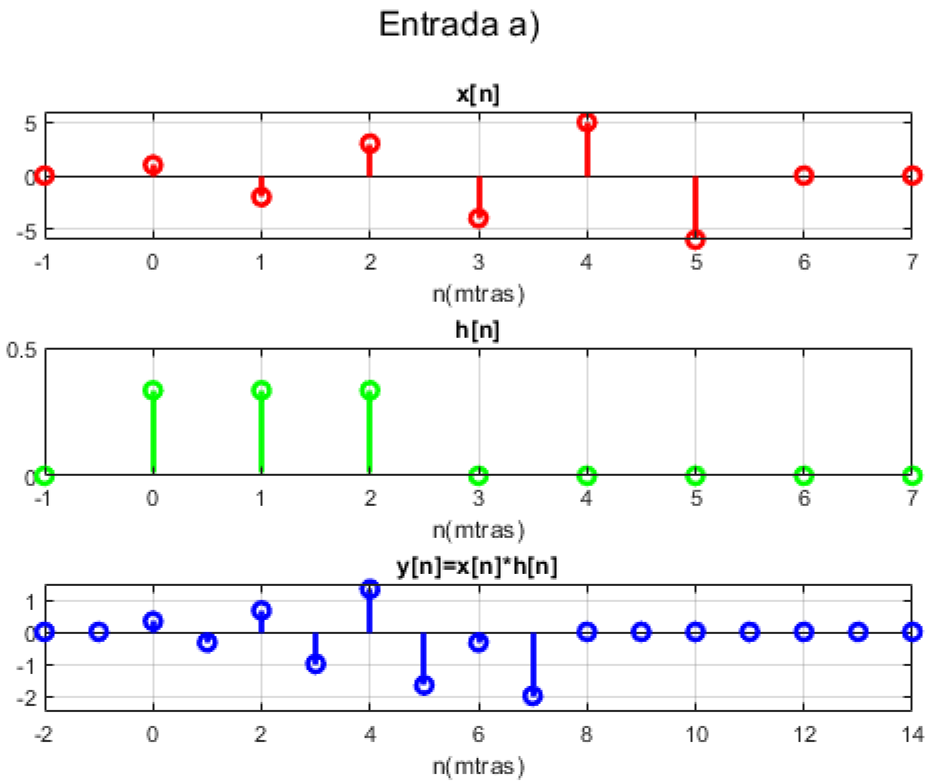
Sanchez Sosa

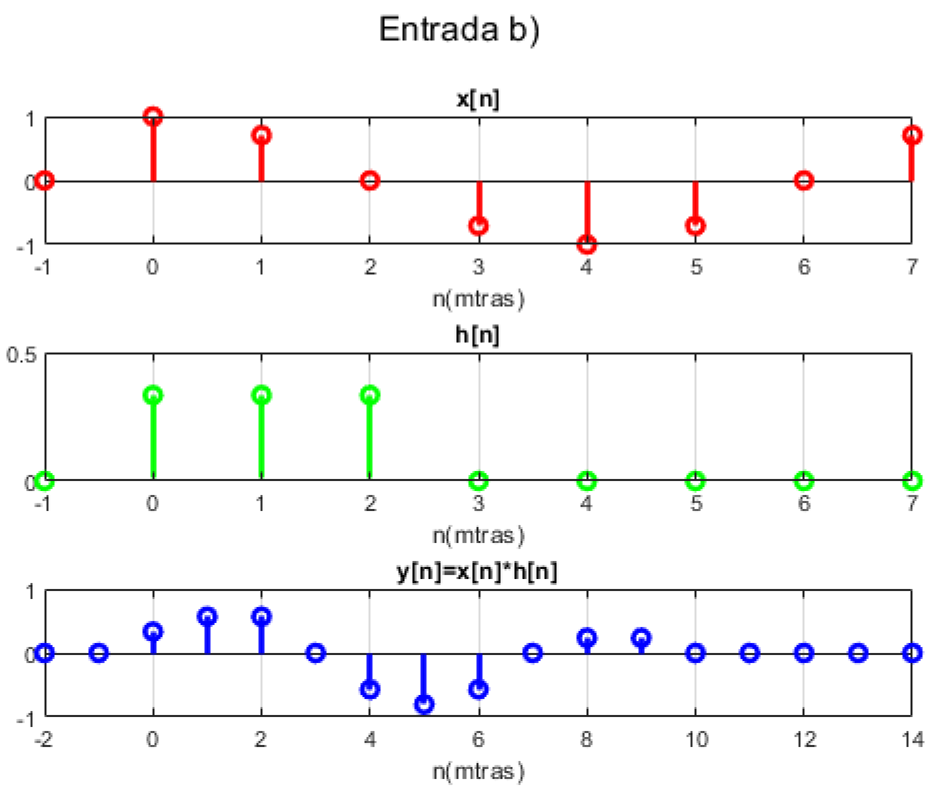
Consigna de la clase #A punto 1.

1. Utilizar MatLab para obtener la salida del siguiente sistema LIT cuya respuesta impulsional se detalla. Verificar ambos resultados analiticamente (las primeras muestras de ser necesario). h[n]=1/3*(d[n]+d[n-1]+d[n-2]) a) x[n]={1,-2,3,-4,5,-6} b) x[n]=cos[(pi/4)*n]*u[n]

```
clc;
clear;
close all;

% a)x[n]={1,-2,3,-4,5,-6}
dni=1;
ni=-1:dni:7;
xa=[0,1,-2,3,-4,5,-6,0,0,]; % x[n]
ha=1/3*(delta(ni)+delta(ni-1)+delta(ni-2)); %
 h[n]=1/3*[0,1,1,1,0,0,0,0,0]
ya=conv(xa,ha);
% Long_Conv(y[n])=Lx+Lh-1
nTa=(ni(1)+ni(1)):(ni(end)+ni(end));

% Grafico a)x[n]={1,-2,3,-4,5,-6}
figure;
sgtitle('Entrada a)')

subplot(311)
stem(ni,xa,'r','linewidth',2)
grid on
axis tight
xlabel('n(mtras)')
title('x[n]')
ylim([-6 6])

subplot(312)
stem(ni,ha,'g','linewidth',2)
grid on
axis tight
xlabel('n(mtras)')
title('h[n]')
ylim([0 0.5])

subplot(313)
stem(nTa,ya,'b','linewidth',2)
grid on
axis tight
xlabel('n(mtras)')
title('y[n]=x[n]*h[n]')
ylim([-2.5 1.5])
```

```
% b)x[n]=cos[(pi/4)*n]*u[n]
% 2*pi*W0=pi/4 -> W0=1/8=k/N0 -> para k=1, N0=8 -> necesito 1 ciclo de
% la senal continua para obtener un periodo de 8 muestras de la senal
% discreta

F0=1/8;
W0=2*pi*F0;
N0=1/F0;
dn_d=1;
n_d=0:dn_d:2*N0-dn_d; % Pido que me muestre 2 periodos de la senal.
xn=cos(W0*n_d).*escalon(n_d);

dni_d=1;
ni_d=-1:dni_d:7;
xb=cos(W0*ni_d).*escalon(ni_d); % Si considero un solo periodo, el
 vector a
% evaluar seria x[n]={1,0.707,0,-0.707,-1,-0.707,0,0.707}
hb=1/3*(delta(ni_d)+delta(ni_d-1)+delta(ni_d-2));
yb=conv(xb,hb);
% Long_Conv(y[n])=Lx+Lh-1
nTb=(ni_d(1)+ni_d(1)):(ni_d(end)+ni_d(end));

% Grafico b)x[n]=cos[(pi/4)*n]*u[n]
figure;
sgtitle('Entrada b)')

subplot(311)
stem(ni_d,xb,'r','linewidth',2)
grid on
axis tight
xlabel('n(mtras)')
title('x[n]')

subplot(312)
stem(ni_d,hb,'g','linewidth',2)
grid on
axis tight
xlabel('n(mtras)')
title('h[n]')
ylim([0 0.5])

subplot(313)
stem(nTb,yb,'b','linewidth',2)
grid on
axis tight
xlabel('n(mtras)')
title('y[n]=x[n]*h[n]')
ylim([-1 1])
```


Entrada a)
x[n]
h[n]
y[n]=x[n]*h[n]
n(mtras)
n(mtras)
n(mtras)


Entrada b)
x[n]
h[n]
y[n]=x[n]*h[n]
n(mtras)
n(mtras)
n(mtras)

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TareaA_Clase7_Punto2

Sanchez Sosa

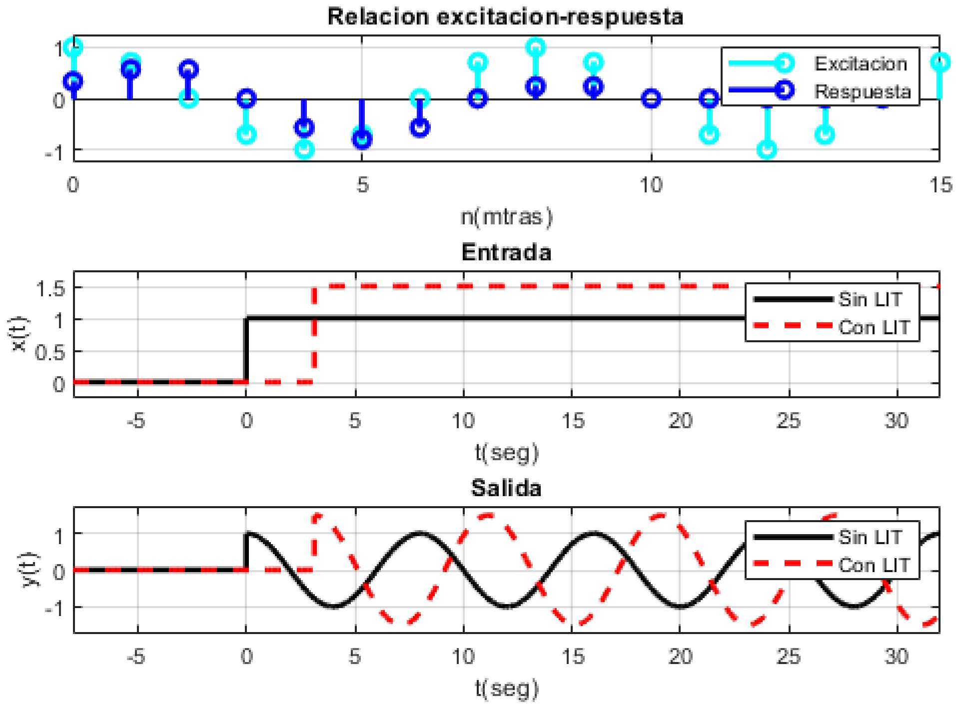
Consigna de la clase #A punto 2.

2. Comparar en un unico gráfico excitacion vs respuesta, el resultado del punto b) ¿Que efecto impone el sistema LIT sobre una senal de tipo sinusoidal? ¿Se modifica su frecuencia? (comparar varios ciclos) - b) x[n]=cos[(pi/4)*n]*u[n]

```
clc;
clear;
close all;

% Funcion b) en tiempo discreto

F0=1/8;
W0=2*pi*F0;
N0=1/F0;
dn_d=1;
n_d=0:dn_d:2*N0-dn_d; % Pido que me muestre 2 periodos de la senal.
xn_d=cos(W0*n_d).*escalon(n_d);

% Funcion b) en tiempo continuo

f0=1/8;
w0=2*pi*f0;
T0=1/f0;
dt=T0/1000; % dt=Ts
t=-(T0-dt):dt:4*T0-dt; % Pido que me muestre 4 periodos de la senal.
x=@(t) escalon(t); % La considero mi entrada del sistema
yt=@(t) cos(W0*t).*x(t); % La considero mi salida del sistema

dni_d=1;
ni_d=0:dni_d:7;
xb=cos(W0*ni_d).*escalon(ni_d); % Si considero un solo periodo, el
 vector
% a evaluar seria x[n]={1,0.707,0,-0.707,-1,-0.707,0,0.707}
hb=1/3*(delta(ni_d)+delta(ni_d-1)+delta(ni_d-2));
yb=conv(xb,hb);
% Long_Conv(y[n])=Lx+Lh-1
nTb=(ni_d(1)+ni_d(1)):(ni_d(end)+ni_d(end));

figure;
sgtitle('Punto n°2')

subplot(311)
stem(n_d,xn_d,'c','linewidth',2)
hold on
stem(nTb,yb,'b','linewidth',2)
grid on
axis tight
xlabel('n(mtras)')
```

```
title('Relacion excitacion-respuesta')
legend('Excitacion','Respuesta')
ylim([-1.25 1.25])

% Chequeo LIT b)-> Considero x(t)=u(t) mi entrada e
% y(t)=cos((pi/4)*t)*x(t)

A=1.5; t0=-pi; % Constantes para evaluar si el sistema es LIT.

subplot(312)
plot(t,x(t),'k',t,A*x(t+t0),'r--','linewidth',2)
grid on
axis tight
xlabel('t(seg)')
ylabel('x(t)')
title('Entrada')
legend('Sin LIT','Con LIT')
ylim([-0.25 1.75])

subplot(313)
plot(t,yt(t),'k',t,A*yt(t+t0),'r--','linewidth',2)
grid on
axis tight
xlabel('t(seg)')
ylabel('y(t)')
title('Salida')
legend('Sin LIT','Con LIT')
ylim([-1.75 1.75])

% Respuesta: La senal de tipo sinusoidal cumple con las propiedades
 del
% sistema LIT. Dicho esto, el sistema LIT no hace que se modifique la
% frecuencia de la senal en cuestion.
```

Punto n°2



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