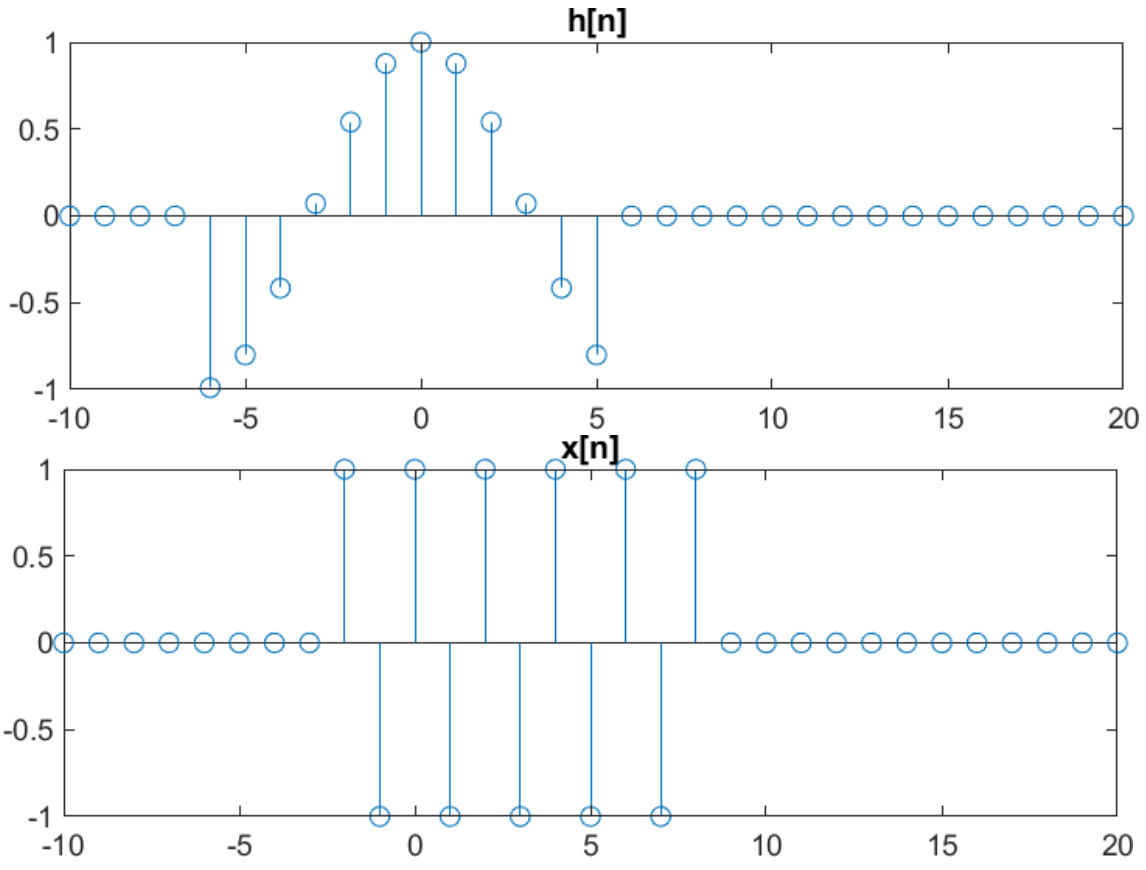
EXAMEN SEÑALES Y SISTEMAS 2021-2022

1.

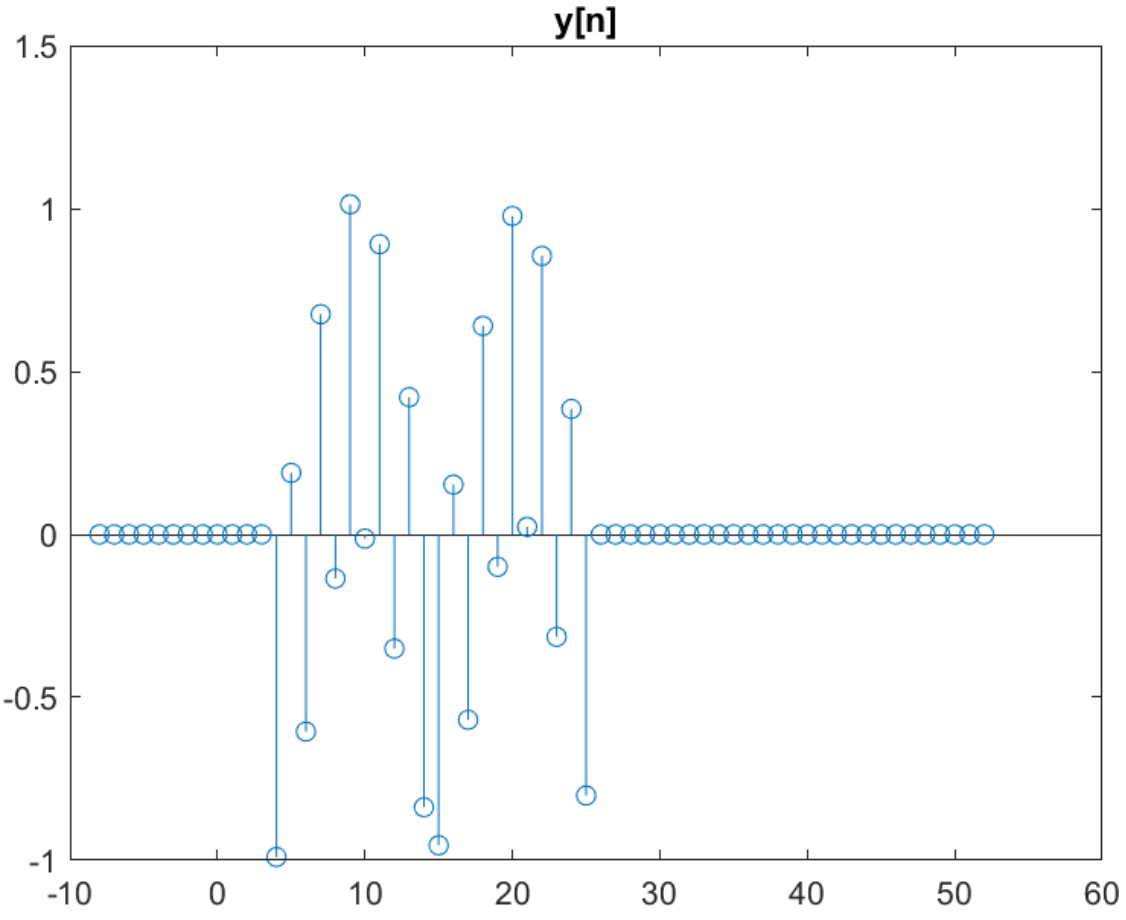
a)

```
n= -10:20;

ini_x=-2;
ini_h=-6;


u1 = zeros(size(n));
u1(n>=-6 & n<=5)=1;

h=cos(n/2).*u1;

u2 = zeros(size(n));
u2(n>=-2 & n<=8)=1;

x = ((-1).^n).*u2;

subplot(211);
stem(n,h);
title('h[n]');

subplot(212);
stem(n,x);
title('x[n]');
```



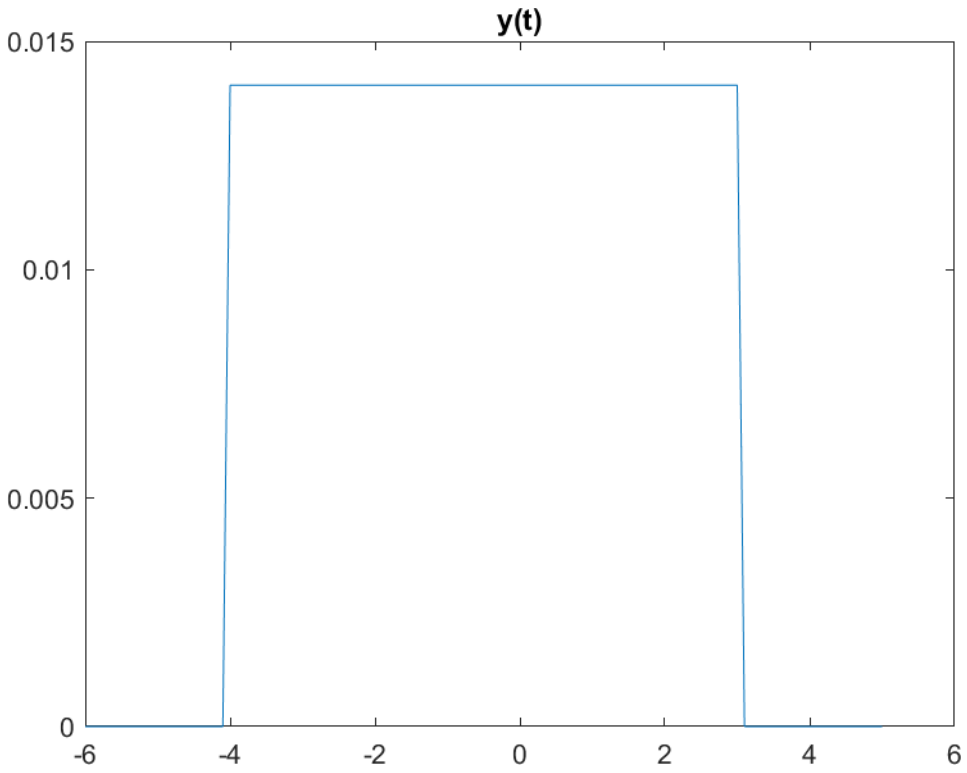
b)

```
function [y,ini_y]=convolucion(x,ini_x,h,ini_h)

n= -10:20;

ini_x=-2;
ini_h=-6;


u1 = zeros(size(n));
u1(n>=-6 & n<=5)=1;

h=cos(n/2).*u1;

u2 = zeros(size(n));
u2(n>=-2 & n<=8)=1;

x = ((-1).^n).*u2;

ini_y = ini_x + ini_h;
y = conv(x,h);

ny= ini_y : length(y)+ ini_y-1;

stem(ny,y);
title('y[n]');
```



2

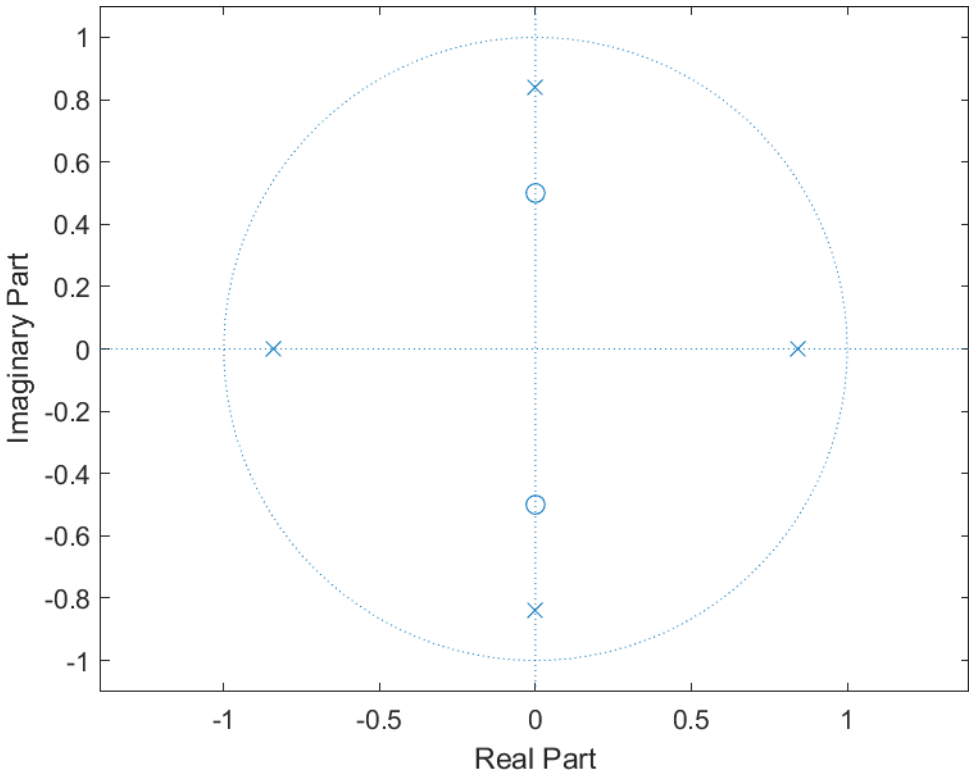
```
t=-6:0.1:5;

u1 = zeros(size(t));
u1(t>=-4 & t<=3)=1;

r= 2.*(exp(1i.*2.*t))/(1+1i.*(t.^2));

x = r.*u1;

plot(t,imag(x));
title('y(t)');
```



3.

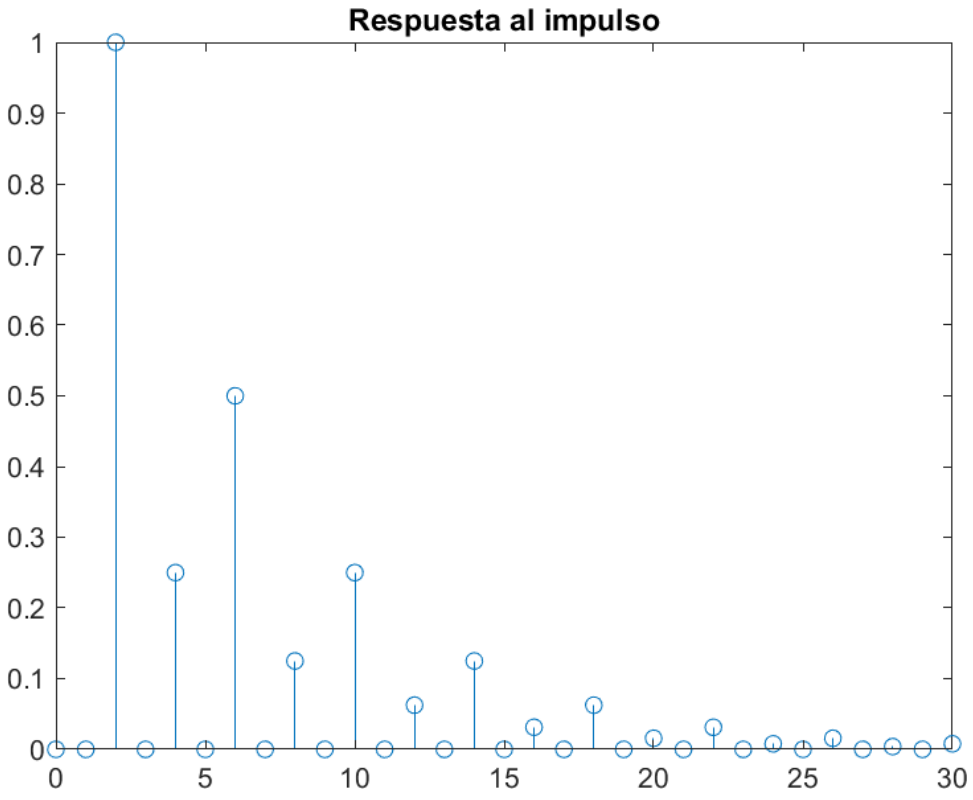
a)

```
a=[1 0 0 0 -1/2];
b= [0 0 1 0 1/4];

ceros=roots(b);
polos=roots(a);

zplane(ceros,polos);
```



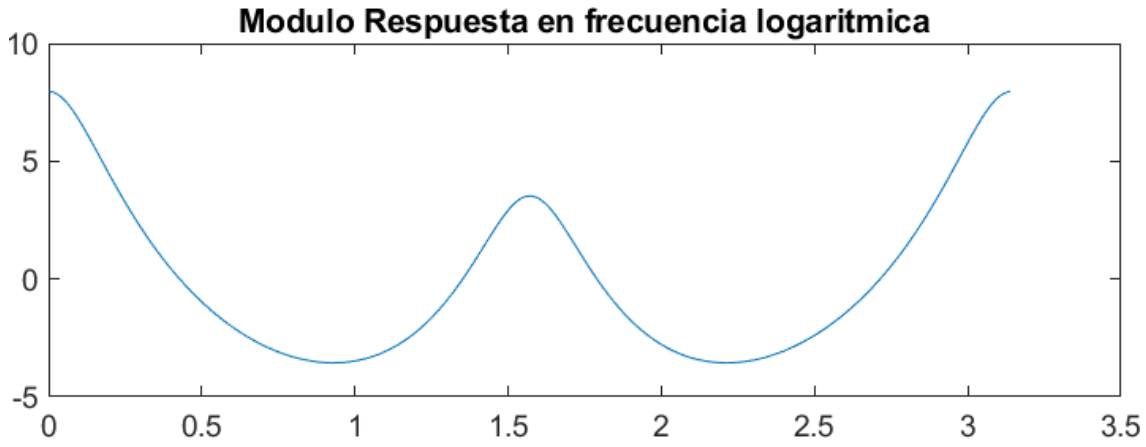
b)

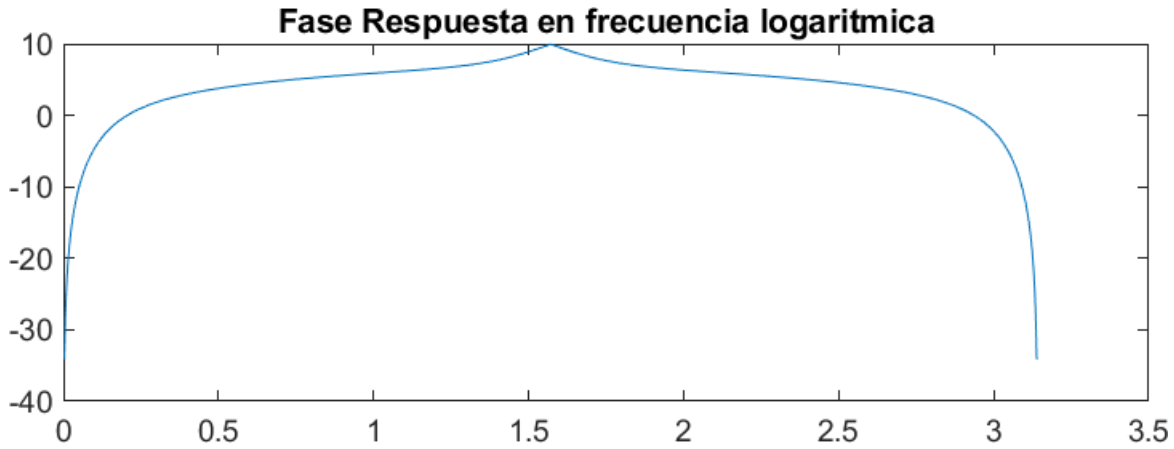
```
a=[1 0 0 0 -1/2];
b= [0 0 1 0 1/4];

n= 0:30;

imp=[1 zeros(1,30)];

h = filter(b,a,imp);

stem(n,h);
title('Respuesta al impulso');
```



c)

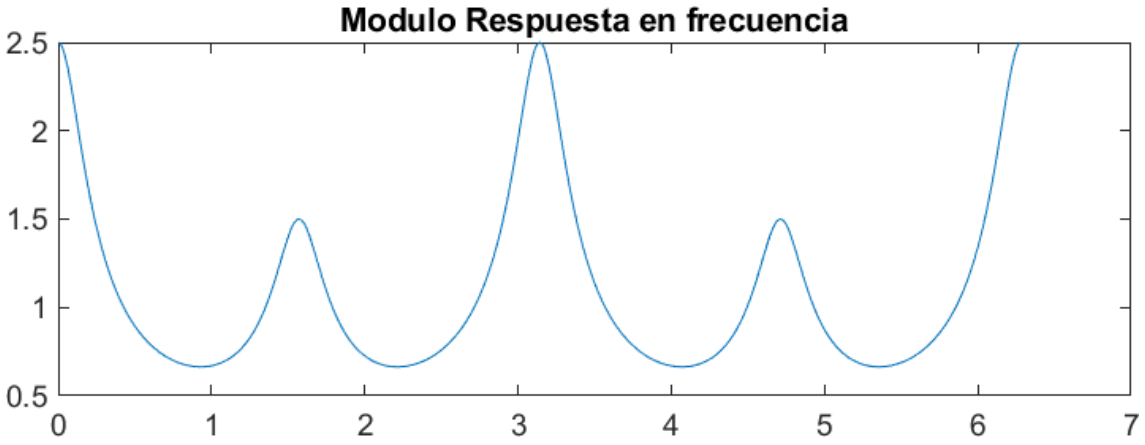
```
a=[1 0 0 0 -1/2];
b= [0 0 1 0 1/4];

n= 0:30;

[H,w]=freqz(b,a,1024);

subplot(211);
plot(w,20*log10(abs(H)));
title('Modulo Respuesta en frecuencia
logaritmica');

subplot(212);
plot(w,20*log10(angle(H)));
title('Fase Respuesta en frecuencia logaritmica');
```

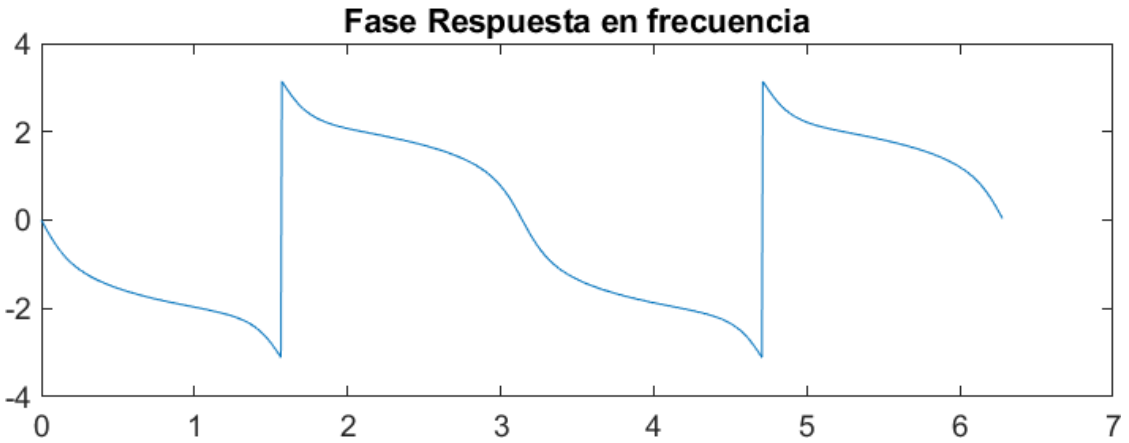




d)

```
a=[1 0 0 0 -1/2];
b= [0 0 1 0 1/4];

n= 0:30;

[H,w]=freqz(b,a,1024,'whole');

subplot(211);
plot(w,abs(H));
title('Modulo Respuesta en frecuencia');

subplot(212);
plot(w,angle(H));
title('Fase Respuesta en frecuencia');
```





e)

```
a=[1 0 0 0 -1/2];
b= [0 0 1 0 1/4];

n= 0:30;

u1 = zeros(size(n));
u1(n>=0 & n<=24)=1;

r = cos(n/2 + pi/5);

x = 4.*u1.*r;
y = filter(b,a,x);

subplot(211);
stem(n,x)
title('Señal x[n]');

subplot(212);
stem(n,y)
title('Señal y[n]');
```