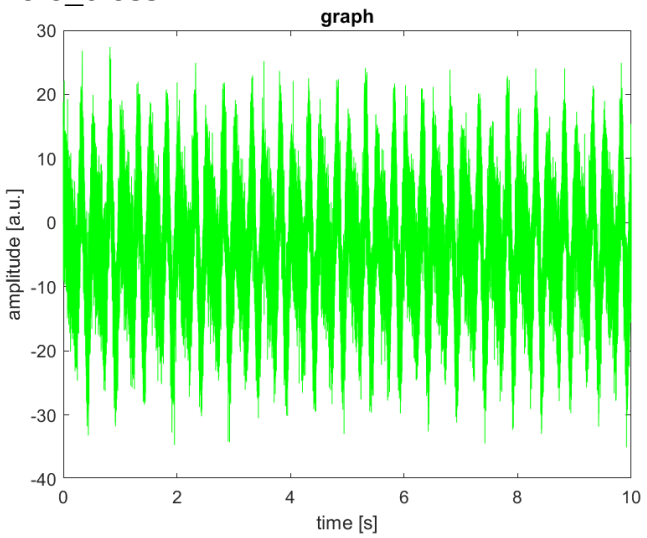
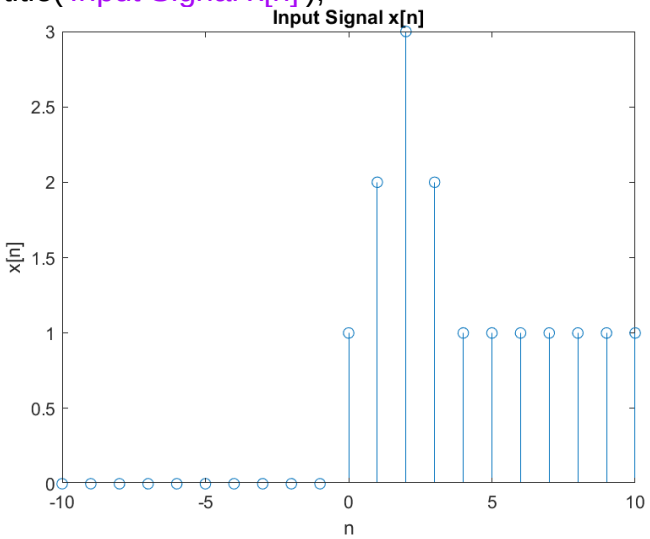
Isil Sonmez

```
%% Task1
x=blackbox.get_signal('Sonmez', 'Isil');
N=length(x)
fs=1e4;
t=(0:N-1)*1/fs;
plot(t,x,'g-')
xlabel('time [s]'), ylabel('amplitude [a.u.]'), title('graph')
%Bias
bias=mean(x)
%Range
Range=max(abs(x))
%RMS
RMS=rms(x)
%SNR
SNR=snr(x)
zero_cross=0;
for i=1:N-1
    if x(i)>0&x(i+1)<0
        zero_cross=zero_cross+1;
    elseif x(i)<0&x(i+1)>0
        zero_cross=zero_cross+1;
    end
    i=i+1;
end
zero_cross
```

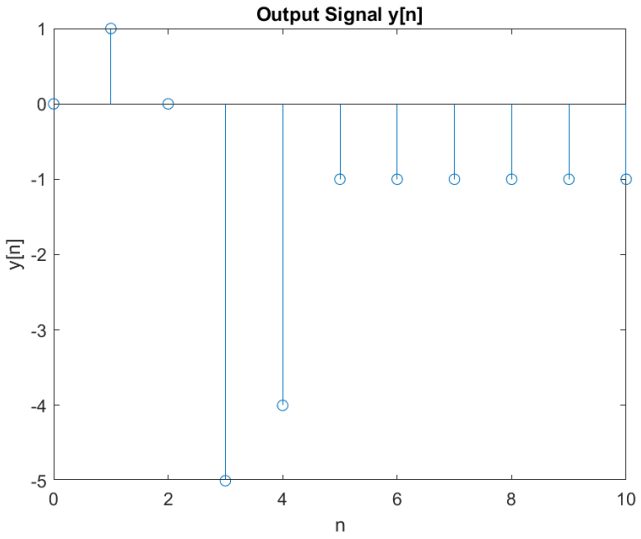



```
%% Task 2

clc;
clear all;

% Part a
j = -10:10;
x = zeros(size(j));

for n = 1:length(j)
    if (j(n) < 0)
        x(n) = 0;
```

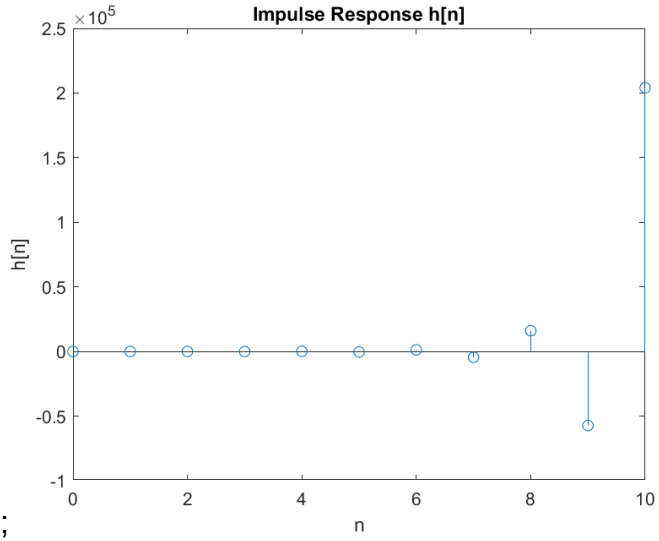
```
    elseif (j(n) >= 0 && j(n) <= 2)
        x(n) = j(n) + 1;
    elseif (j(n) >= 3 && j(n) <= 4)
        x(n) = 5 - j(n);
    elseif (j(n) >= 5)
        x(n) = 1;
    end
end

figure;
stem(j, x);
xlabel('n');
ylabel('x[n]');
title('Input Signal x[n]');
```



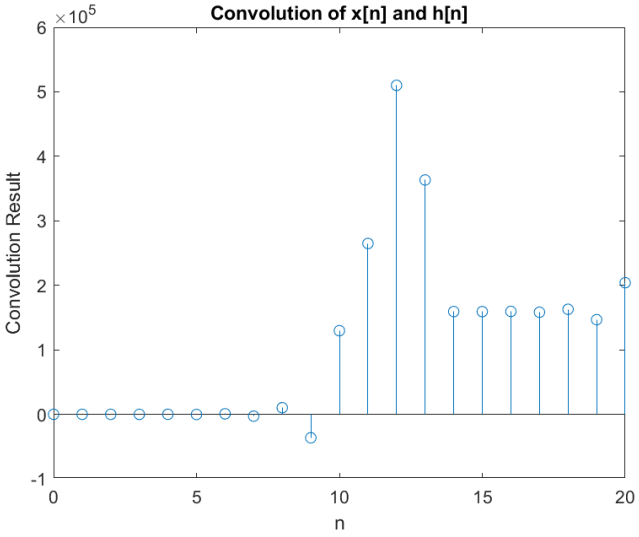

```
% Part b
i = 0:10;
x = zeros(size(i));
y = zeros(size(i));
for n = 1:length(i)
    if (i(n) >= 0 && i(n) <= 2)
        x(n) = i(n) + 1;
    elseif (i(n) >= 3 && i(n) <= 4)
        x(n) = 5 - i(n);
    elseif (i(n) >= 5)
        x(n) = 1;
    end
    if (n >= 2)
        y(n) = 2 * x(n) - 3 * x(n - 1);
    end
end

figure;
stem(i, y);
xlabel('n');
ylabel('y[n]');
title('Output Signal y[n]');
```



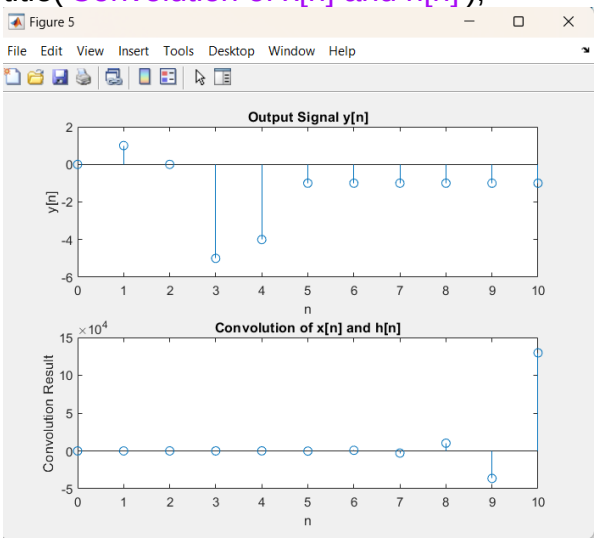

```
% Part c
h = zeros(size(i));
h(1) = 2;
h(2) = 2 - 3;
for n = 3:length(i)
    h(n) = 2 - 3 * h(n - 1) + 2 * h(n - 2);
end

figure;
stem(i, h);
xlabel('n');
ylabel('h[n]');
```




```
title('Impulse Response h[n]');

% Part d
conv_result = conv(x, h);

figure;
stem((0:length(conv_result)-1), conv_result);
xlabel('n');
ylabel('Convolution Result');
title('Convolution of x[n] and h[n]');
```




```
% Part e
figure;
subplot(2,1,1);
stem(i, y, 'DisplayName', 'Output Signal y[n]');
xlabel('n');
ylabel('y[n]');
title('Output Signal y[n]');

subplot(2,1,2);
stem(i, conv_result(1:length(i)), 'DisplayName', 'Convolution Result');
xlabel('n');
ylabel('Convolution Result');
title('Convolution of x[n] and h[n]');
```




```
%% Task 3

clc
clear all

Input = importdata("clapandbass.mp3");
data = Input.data(:,1);
Fs = Input.fs;
dt = 1/Fs;
%figure(3)
%plot(Input.data)
%sound (data, Fs)
coeff = data(860216:861262);
```

```
figure(2)
plot(data)
xlabel('time [s]')
ylabel('amplitude [u.a.]')
figure(1)
[r, lags] = xcorr(data, coeff);
plot(lags,r)
xlim([0 1500000])
ylabel('autocorrelation')
xlabel("lags")
```