Difference Equations

Code 1:-

```
clc
clear all
syms n k1 k2 c_1 c_2 c_3 c_4 c_5 s
a=input('Enter the coefficient of y_(n+2) : ');
b=input('Enter the coefficient of y_(n+1) : ');
c=input('Enter the coefficient of y_n : ');
eq=a*s^2 + b*s + c;
r=solve(eq,s);
if imag(r)~=0
    b=real(r(1))^2 + imag(r(1))^2 + 2;
    rho = sqrt(b);
    theta = atan(abs(imag(r(1)))/real(r(1)));
    y1 = (rho^n)*cos(n*theta);
    y2 = (rho^n)*sin(n*theta);
elseif r(1)==r(2)
    y1 = r(1)^n;
    y2 = n*(r(1)^n);
else
    y1 = r(1)^n;
    y2 = r(2)^n;
end
y_c = k1*y1 + k2*y2;
y_0 = input('y(0) : ');
y_1 = input('y(1) : ');
yc0 = subs(y_c,n,0);
yc1 = subs(y_c,n,1);
eq0 = yc0 - y_0;
eq1 = yc1 - y_1;
[k1 k2] = solve(eq0,eq1);
y_s = subs(y_c)
m = 0:10;
y_s = subs(y_s,n,m)
stem(y_s)
```

Problem 1 :-

Enter the coefficient of y_(n+2) : 1

Enter the coefficient of y_(n+1) : -8

Enter the coefficient of y_n : 12

y(0) : 0

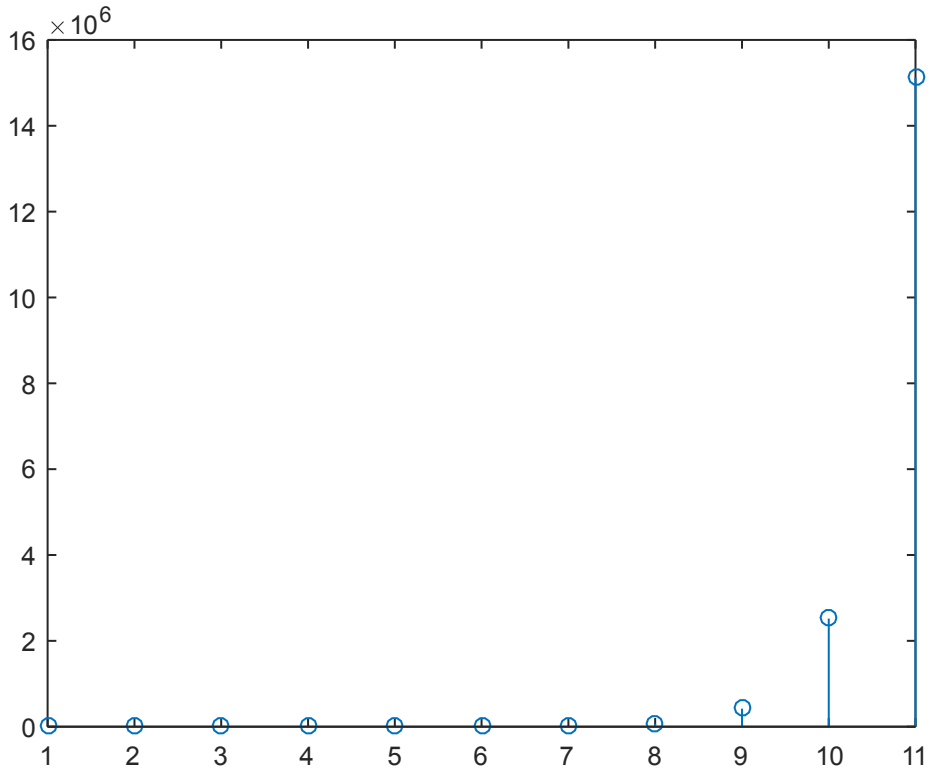
y(1) : 1

y_s =

6^n/4 - 2^n/4

y_s =

[0, 1, 8, 52, 320, 1936, 11648, 69952, 419840, 2519296, 15116288]



Problem 2 :-

Enter the coefficient of y_(n+2) : 1

Enter the coefficient of y_(n+1) : -2

Enter the coefficient of y_n : 1

y(0) : 0

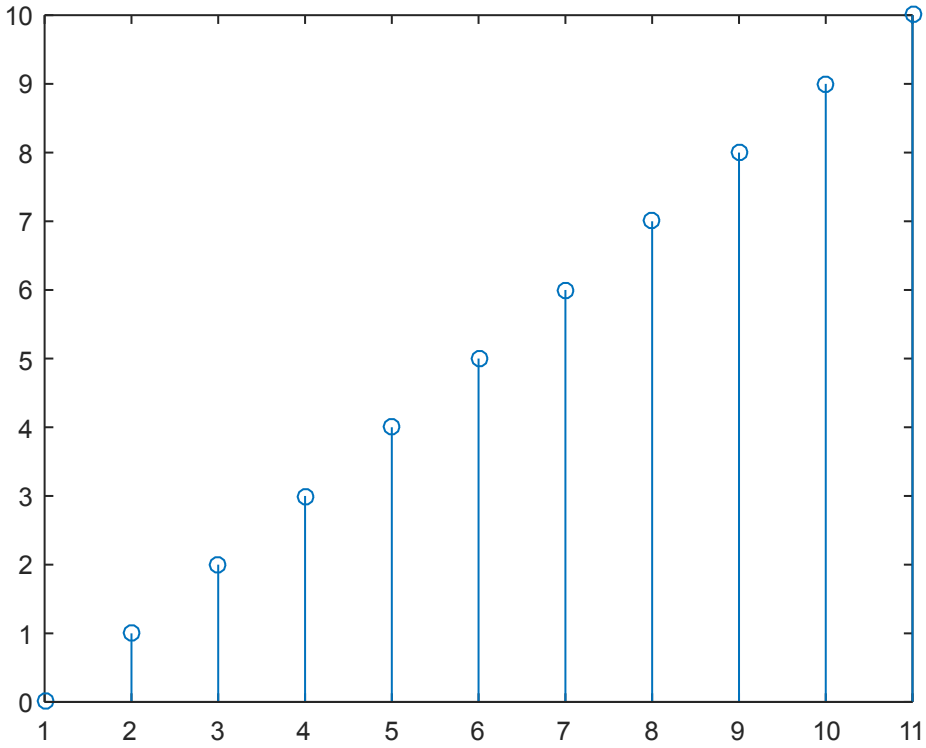
y(1) : 1

y_s =

n

y_s =

[0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10]



Problem 3 :-

Enter the coefficient of y_(n+2) : 1

Enter the coefficient of y_(n+1) : 1

Enter the coefficient of y_n : 2

y(0) : 0

y(1) : 1

y_s =

(2^(1/2)*2^n*7^(1/2)*sin(n*atan(7^(1/2))))/7

y_s =

[0, 1, (4*2^(1/2)*7^(1/2)*sin(2*atan(7^(1/2))))/7,
(8*2^(1/2)*7^(1/2)*sin(3*atan(7^(1/2))))/7, (16*2^(1/2)*7^(1/2)*sin(4*atan(7^(1/2))))/7,
(32*2^(1/2)*7^(1/2)*sin(5*atan(7^(1/2))))/7, (64*2^(1/2)*7^(1/2)*sin(6*atan(7^(1/2))))/
7, (128*2^(1/2)*7^(1/2)*sin(7*atan(7^(1/2))))/7,
(256*2^(1/2)*7^(1/2)*sin(8*atan(7^(1/2))))/7,
(512*2^(1/2)*7^(1/2)*sin(9*atan(7^(1/2))))/7,
(1024*2^(1/2)*7^(1/2)*sin(10*atan(7^(1/2))))/7]