Z-Transform

- 1 April 2019

Code :-

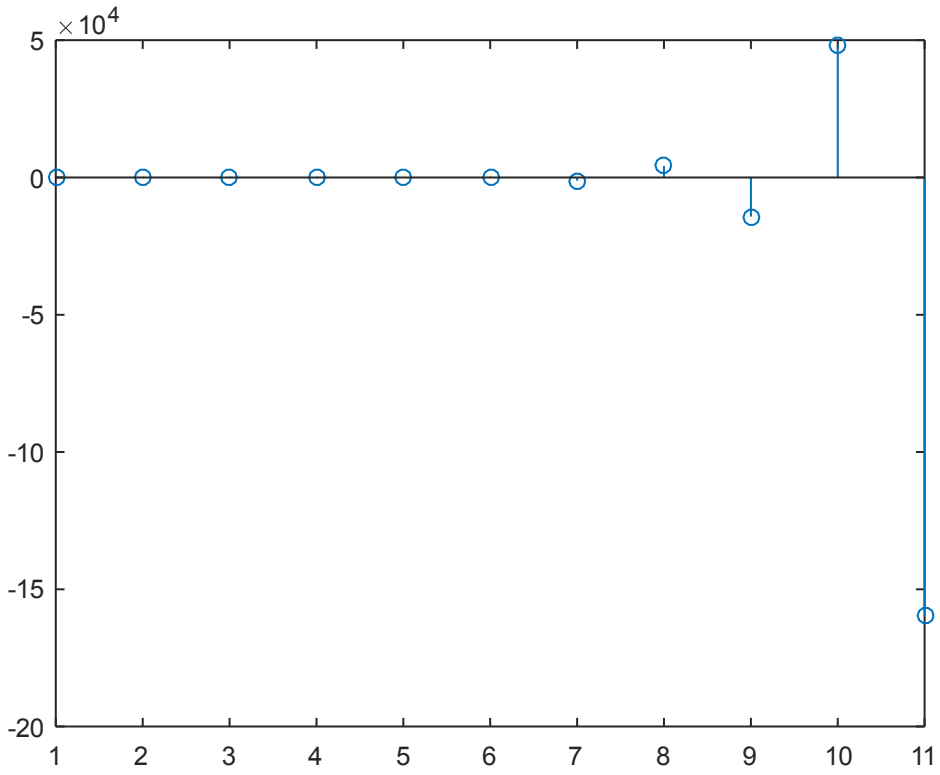
```
clc
clear all
syms n z F
a = input('Enter the coefficient of f_(n+2): ');
b = input('Enter the coefficient of f_(n+1): ');
c = input('Enter the coefficient of f_n: ');
G=input('Enter the RHS function : ');
d=input('Enter the value of f_0:');
e=input('Enter the value of f_1:');
eq1=a*sym('f(n+2)')+b*sym('f(n+1)')+c*sym('f(n)')-G;
eq2=ztrans(eq1);
eq3=subs(eq2,{'ztrans(f(n),n,z)','f(0)','f(1)'},{F,d,e});
eq4=collect(eq3,F);
F=solve(eq4,F)
disp('solution of the difference equation is given by:');
f=simplify(iztrans(F));
disp(f)
m=0:10;
f1=subs(f,n,m);
stem(f1)
```

Problem - 1

```
Enter the coefficient of f_(n+2): 1

Enter the coefficient of f_(n+1): 6

Enter the coefficient of f_n: 9

Enter the RHS function : 2^n

Enter the value of f_0:0

Enter the value of f_1:1


F =
```

```
(z + z/(z - 2))/(z^2 + 6*z + 9)
```

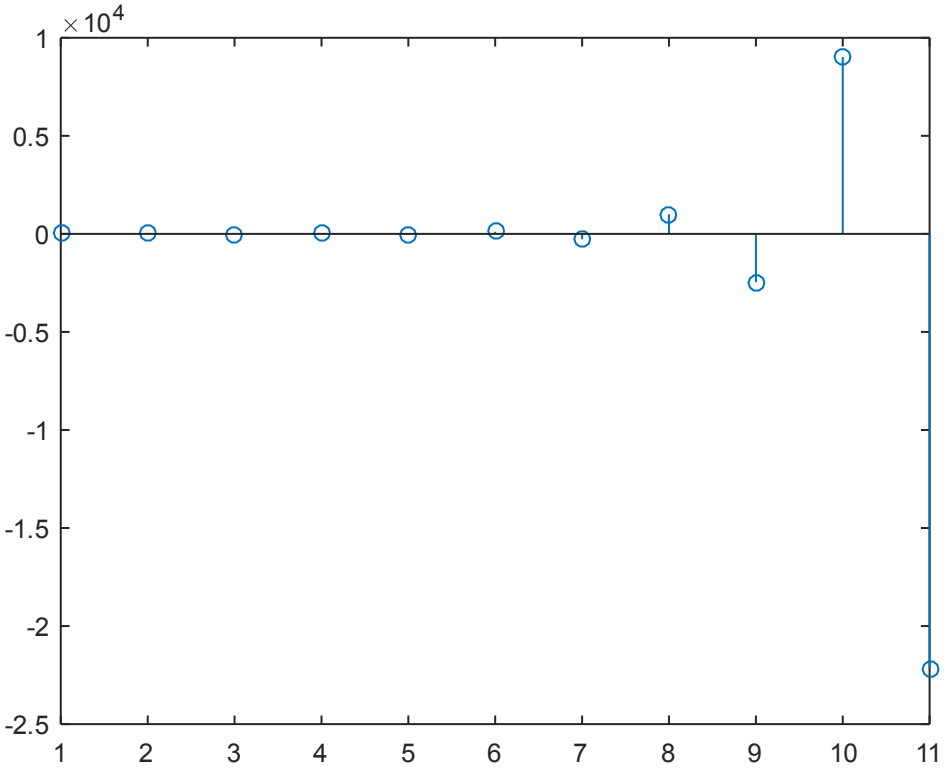
```
solution of the difference equation is given by:
2^n/25 - (4*(-3)^n*n)/15 - (-3)^n/25
```



Problem - 2

```
Enter the coefficient of f_(n+2): 1
Enter the coefficient of f_(n+1): 4
Enter the coefficient of f_n: 3
Enter the RHS function : 3^n
Enter the value of f_0:0
Enter the value of f_1:1
```

```
F =


(z + z/(z - 3))/(z^2 + 4*z + 3)


solution of the difference equation is given by:

(3*(-1)^n)/8 - (5*(-3)^n)/12 + 3^n/24
```



Problem - 3

```
Enter the coefficient of f_(n+2): 1

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

Enter the coefficient of f_n: 2

Enter the RHS function : 5^n

Enter the value of f_0:0

Enter the value of f_1:1
```

```
F =


(z + z/(z - 5))/(z^2 + z + 2)


solution of the difference equation is given by:

5^n/32 - ((-1)^n*7^(1/2)*(1/2 - (7^(1/2)*1i)/2)^(n - 1)*53i)/112 +
((-1)^n*7^(1/2)*((7^(1/2)*1i)/2 + 1/2)^(n - 1)*53i)/112 -
(27*(-1)^n*2^n*cos(n*acos(2^(1/2)/4)))/(16*(2^(1/2))^n)
```