LAB ASSIGNMENT 5

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Slot: L11+L12

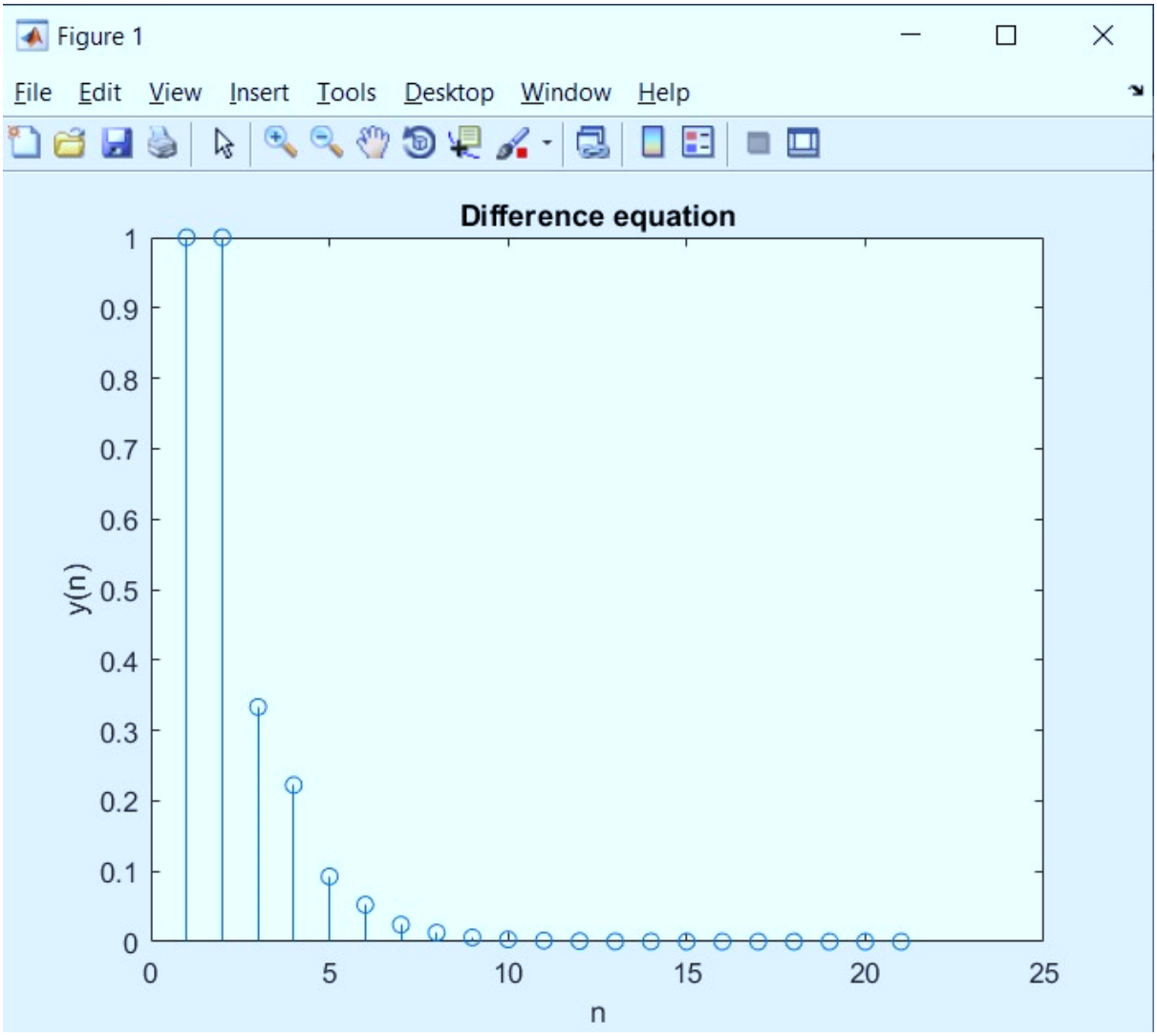
Ques 1. Solve $6yn+2 - yn+1 - yn = 0$, $y(0) = y(1) = 1$, using Z-transformation.

Ans.

```
clear all
clc
syms n z y(n) Y
yn=y(n);
yn1=y(n+1);
yn2=y(n+2);
F = input('Input the coefficients [a,b,c]:  ');
a=F(1);b=F(2);c=F(3);
nh = input('Enter the non-homogenous part f(n):  ');
eqn=a*yn2+b*yn1+c*yn-nh;
ZTY=ztrans(eqn);
IC=input('Enter the initial conditions in the form [y0,y1]:');
y0=IC(1);
y1=IC(2);
ZTY=subs(ZTY,{'ztrans(y(n),n,z)','y(0)','y(1)'},{Y,y0,y1});
eq=collect(ZTY,Y);
Y=simplify(solve(eq,Y));
yn=simplify(iztrans(Y));
disp('The solution of the difference equation yn=')
disp(yn);
m=0:20;
y=subs(yn,n,m);
stem(y)
title('Difference equation');
xlabel('n');
ylabel('y(n)');
```

```
Command Window
  Input the coefficients [a,b,c]:  [6 -1 -1]
  Enter the non-homogenous part f(n):  0
fx Enter the initial conditions in the form [y0,y1]:[1 1]
```

```
The solution of the difference equation yn=
(8*(1/2)^n)/5 - (3*(-1/3)^n)/5
```



Ques 2. Solve $yn+2 - 5yn+1 + 6yn = 36$, $y(0) = y(1) = 0$, using Z-transformation. Ans.

```
clear all
clc
syms n z y(n) Y
yn=y(n);
yn1=y(n+1);
yn2=y(n+2);
F = input('Input the coefficients [a,b,c]:  ');
a=F(1);b=F(2);c=F(3);
nh = input('Enter the non-homogenous part f(n):  ');
eqn=a*yn2+b*yn1+c*yn-nh;
ZTY=ztrans(eqn);
IC=input('Enter the initial conditions in the form [y0,y1]:');
y0=IC(1);
y1=IC(2);
ZTY=subs(ZTY,{'ztrans(y(n),n,z)','y(0)','y(1)'},{Y,y0,y1});
eq=collect(ZTY,Y);
Y=simplify(solve(eq,Y));
yn=simplify(iztrans(Y));
disp('The solution of the difference equation yn=')
disp(yn);
m=0:20;
y=subs(yn,n,m);
stem(y)
title('Difference equation');
xlabel('n');
ylabel('y(n)');
```

Command Window

```
Input the coefficients [a,b,c]:  [1 -5 6]
Enter the non-homogenous part f(n):  36
Enter the initial conditions in the form [y0,y1]:[0 0]
```

```
The solution of the difference equation yn=
18*3^n - 36*2^n + 18
```

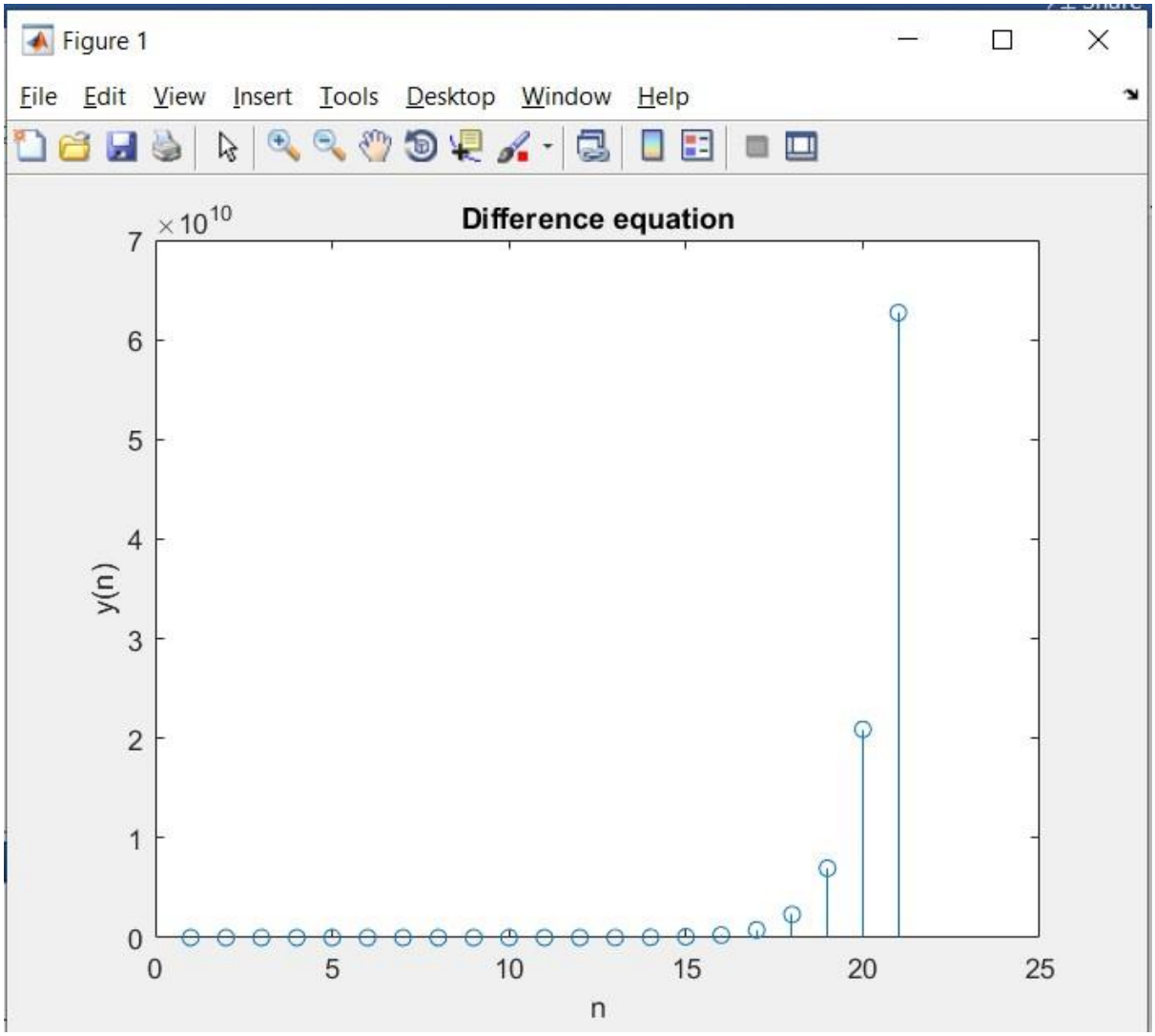


Figure 1
File Edit View Insert Tools Desktop Window Help
Difference equation
×10^10
7
6
5
4
3
2
1
0
y(n)
0
5
10
15
20
25
n