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Experiment 9

Aim: (a) To transform and observe discrete time signal in z plane using Z transform.

1. $X_1(n) = 0.9^n u(n)$
2. $X_2(n) = u(n)-u(n-10)$
3. $X_3(n)=\cos(w_o n)u(n)$

Code:

```
clc;

clear all;
close all;
syms n wo
%(i) x1(n)=(0.9)^n u(n)
x1= (0.9)^n*heaviside(n);
X1=ztrans(x1)
simplify(X1)

%(ii) x2(n) = u(n) - u(n-10)
x2 = heaviside(n)- heaviside(n-10);
X2=ztrans(x2)
simplify(X2)

%(iii) x3(n) = cos(wo*n)*u(n)
x3 = cos(wo*n)*heaviside (n);
X3 = ztrans(x3)
simplify(X3)
```

Output:

X1 =

1/((10*z)/9 - 1) + 1/2

```
   1     1
-------- + -
10 z      2
---- - 1
 9
```

X2 =

1/(z - 1) - (1/(z - 1) + 1/2)/z^10 + 1/2

```
       1    1
      ----- + -
 1    z - 1  2   1
----- - --------- + -
z - 1      10     2
        z
```

X3 =

ztrans(cos(wo*(n + 1)), n, z)/z + 1/2

```
ztrans(cos(wo (n + 1)), n, z)   1
------------------------------ + -
          z              2
```

Conclusion: We have successfully transformed and observed discrete time signal in z-plane using Z transform.