

# Experiment No: 16

## Experiment Name: Inverse Z-Transform

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### Description of the Problem:

The objective of this experiment is to find the **inverse Z-transform** of a given Z-domain function using MATLAB.

The inverse Z-transform converts a signal from the **Z-domain (frequency domain)** back to the **time domain**, allowing us to obtain the discrete-time sequence  $x[n]$ .

MATLAB's symbolic math toolbox provides the function **iztrans()** to directly compute the inverse Z-transform.

### Basic Formula:

If

$$X(z) \xleftrightarrow{Z} x[n]$$

Then,

$$x[n] = Z^{-1}\{X(z)\}$$

This experiment demonstrates how to compute this using symbolic expressions.

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### Source Code Sample:

```
clc;
clear all;
close all;

% Define symbolic variables
syms z n

% Ask user to enter the Z-transform function
X = input('Enter the Z-transform X(z) (use z as the variable): ');
```

```
% Compute inverse Z-transform  
x = iztrans(X, z, n);  
  
% Display the result  
disp('Inverse Z-Transform x[n] = ');  
disp(x);
```

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## Sample Input:

Enter the Z-transform X(z):  $1/(1 - 0.5z^{-1})$

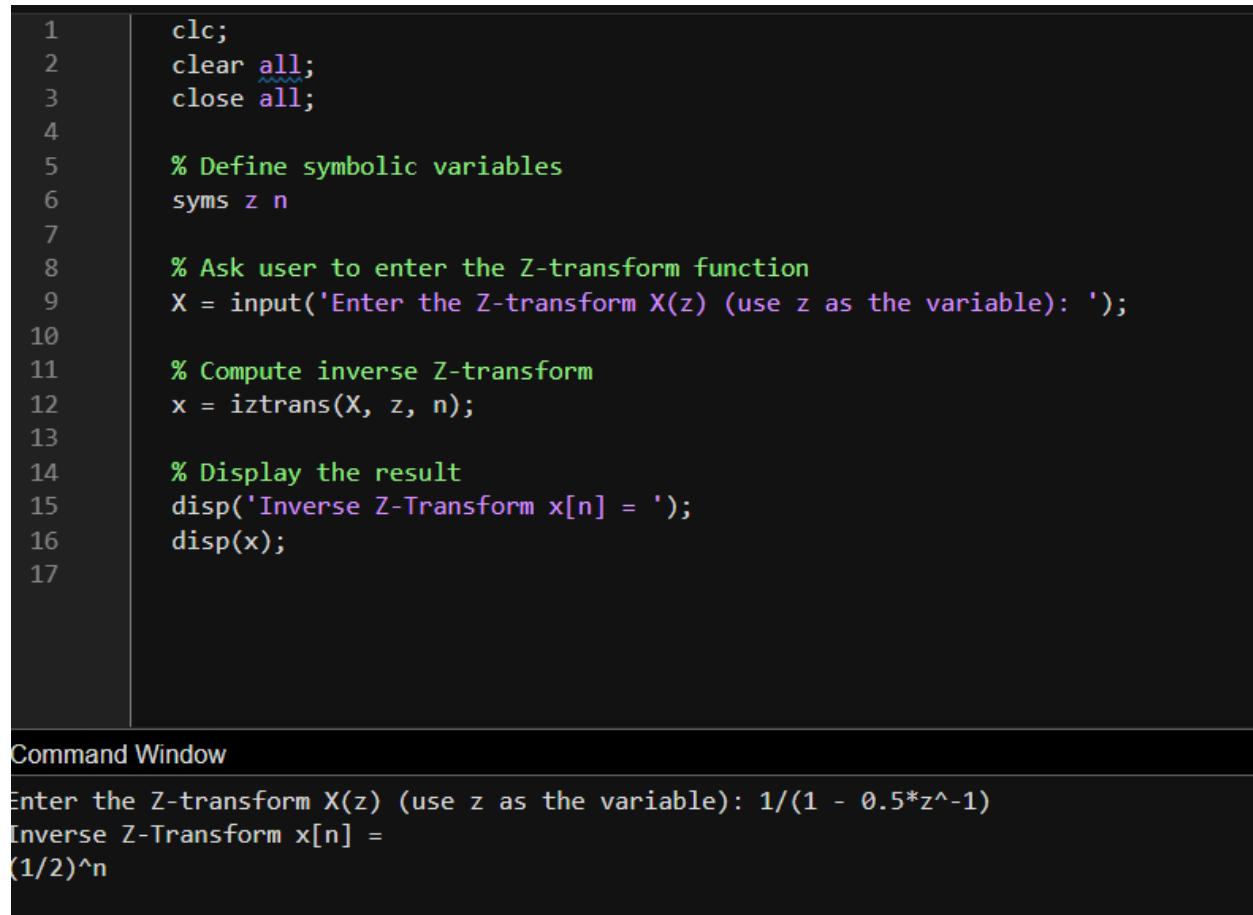
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## Sample Output:

Inverse Z-Transform x[n] =  
 $(1/2)^n * u[n]$

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## Screenshot:



The screenshot shows the MATLAB Command Window with the following content:

```
1 clc;  
2 clear all;  
3 close all;  
4  
5 % Define symbolic variables  
6 syms z n  
7  
8 % Ask user to enter the Z-transform function  
9 X = input('Enter the Z-transform X(z) (use z as the variable): ');  
10  
11 % Compute inverse Z-transform  
12 x = iztrans(X, z, n);  
13  
14 % Display the result  
15 disp('Inverse Z-Transform x[n] = ');  
16 disp(x);  
17
```

Command Window

```
Enter the Z-transform X(z) (use z as the variable):  $1/(1 - 0.5z^{-1})$   
Inverse Z-Transform x[n] =  
 $(1/2)^n$ 
```

