## Discrete Assignment-11.9.1-11

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## **Problem Statement**

Write the first five terms in the sequence:

$$a_1 = 3 \tag{1}$$

$$a_n = 3a_{n-1} + 2 \quad \text{for } n > 0$$
 (2)

## Solution

Term	Value
$a_1$	3
$a_n$	$3a_{n-1} + 2 \text{ for } n > 1$

Table 1: Input Equations

So, the first 5 terms of the sequence are (3, 11, 35, 107, 323).

The difference equation is:

$$x(n) - 3x(n-1) = 3u(n) - u(n-1)$$
(3)

$$y(n) - 3y(n-1) = 3x(n) - x(n-1)$$
(4)

$$Y(z)(1 - 3z^{-1}) = 3X(z) - z^{-1}X(z)$$
(5)

$$Y(z) = \frac{3X(z) - z^{-1}X(z)}{1 - 3z^{-1}} \tag{6}$$

$$H(z) = \frac{3 - z^{-1}}{1 - 3z^{-1}} \tag{7}$$

$$Y(z) = X(z)H(z) \tag{8}$$

$$Y(z) = \frac{3 - z^{-1}}{1 - 3z^{-1}} - \frac{1}{1 - z^{-1}}$$
(9)

$$Y(z) = \frac{4}{1 - 3z^{-1}} - \frac{1}{1 - z^{-1}}$$
(10)

$$y(n) = u(n)(4.3^{n} - 1)$$
 where  $x(n) = u(n)$  (11)

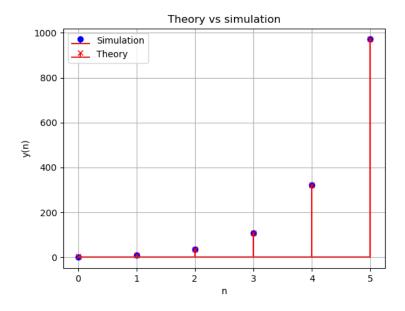


Figure 1: Sequence