Discrete Assignment-11.9.1-11

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Problem Statement

Write the first five terms in the sequence:

$$a_0 = 3 \tag{1}$$
$$a_n = 3a_{n-1} + 2 \quad \text{for } n > 0 \tag{2}$$

Solution

Term	Value
a_1	3
a_n	$3a_{n-1} + 2$ 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:

$$x(n) - 3x(n-1) = 3u(n) - u(n-1) \tag{3}$$
$$y(n) - 3y(n-1) = 3x(n) - x(n-1) \tag{4}$$
$$Y(z)(1 - 3z^{-1}) = 3X(z) - z^{-1}X(z) \tag{5}$$
$$Y(z) = \frac{3X(z) - z^{-1}X(z)}{1 - 3z^{-1}} \tag{6}$$
$$H(z) = \frac{3 - z^{-1}}{1 - 3z^{-1}} \tag{7}$$
$$Y(z) = X(z)H(z) \tag{8}$$
$$Y(z) = \frac{3 - z^{-1}}{1 - 3z^{-1}} - \frac{1}{1 - z^{-}1} \tag{9}$$
$$Y(z) = \frac{4}{1 - 3z^{-1}} - \frac{1}{1 - z^{-1}} \tag{10}$$
$$y(n) = u(n)(4.3^n - 1) \qquad where \quad x(n) = u(n) \tag{11}$$

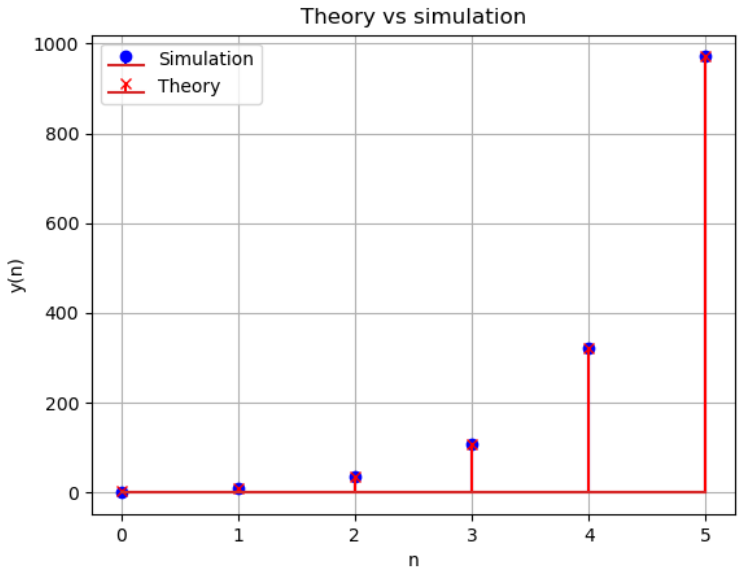

Figure 1: Sequence