

Discrete Assignment

EE:1205 Signals and Systems
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I. QUESTION 10.5.2.13

How many 3 digit numbers are divisible by 7?

II. SOLUTION

TABLE 1
INPUT PARAMETERS

| Parameter | Used to denote | Values |
|-----------|--------------------------|--------------|
| $x(0)$ | First Term | $x(0) = 105$ |
| d | Common difference of A.P | $d = 7$ |

Three digit numbers which are divisible by 7 are 105, 112, 119, ..., 994, which form an arithmetic progression (A.P). The number of terms in the AP $x(n)$ is given by:

$$\frac{x(n) - x(0)}{d} + 1 \quad (1)$$

$$X(z) = \frac{x(0)}{1 - z^{-1}} + d \frac{z^{-1}}{(1 - z^{-1})^2} \quad (2)$$

$|z| > 1$ as it is an AP

$$x(n) = (105 + (n)7)u(n) \quad (3)$$

Using the values in Table 1 :

$$k = \frac{994 - 105}{7} + 1 = 128 \quad (4)$$

Taking z transform of (3) :

$$X(z) = \frac{105 - 98z^{-1}}{(1 - z^{-1})^2} \quad (5)$$

$|z| > 1$

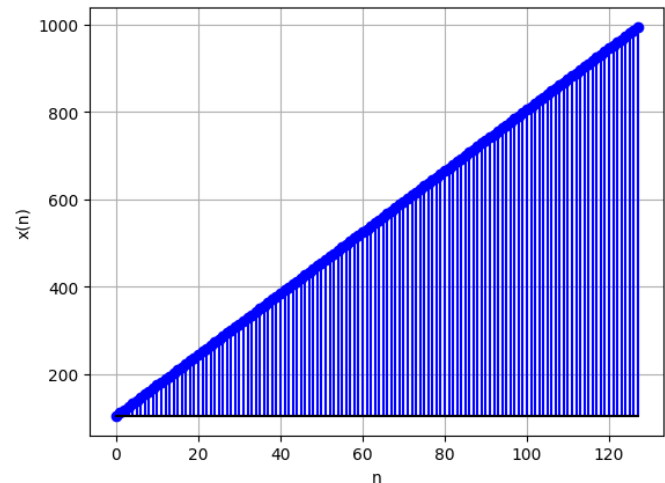


Fig. 1. Plot of $x(n)$