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 0
Input Parameters

Parameter	Used to denote	Values
$x_i(n)$	n^{th} term	$(x_i(0)+nd_i)\,u(n)$
$x_i(0)$	First Term	$x(0)=105$
d	Common difference of A.P	$d=7$

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

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

$$X_i(z)=\frac{x_i(0)}{1-z^{-1}}+d_i\frac{z^{-1}}{(1-z^{-1})^2}\text{ , for i=1,2} \tag{2}$$

ROC : $|z|>1$ as it is an AP (3)

$$x_1(n)=(105+(n)\,7)\,u(n) \tag{4}$$

Using the values in table

$$k_1=\frac{994-105}{7}+1=128 \tag{5}$$

Using the values in table :

$$X_1(z)=\frac{105-z^{-1}}{(1-z^{-1})^2} \tag{6}$$

ROC is $|z|>1$

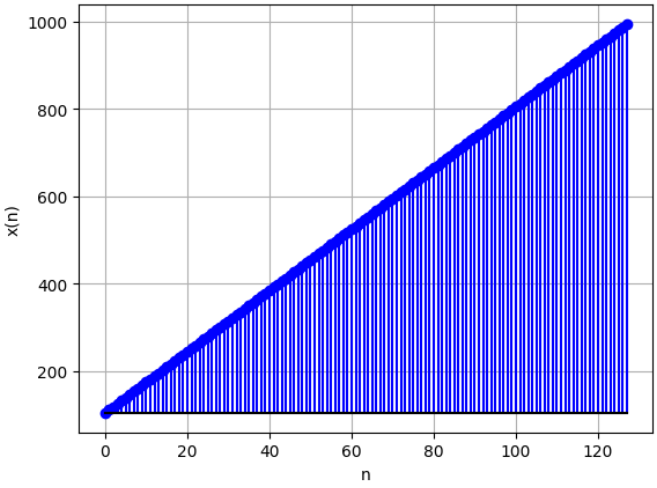

Fig. 0. Plot of $x(n)$