

Assignment-2

EE:1205 Signals and systems
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I. QUESTION 1.2.4

How many terms of the AP : 9, 17, 25, . . . must be taken to give a sum of 636?

II. SOLUTION

Parameter	Description	Value
$x(0)$	First Term	9
d	Common Difference	8
S_n	Sum of n terms	636

TABLE 0
PARAMETER TABLE

We know the formula

$$S_n = \frac{(n+1)}{2} [2x(0) + d(n)] \quad (1)$$

Putting in values from the table

$$636 = \frac{(n+1)}{2} [18 + 8n] \quad (2)$$

$$636 = (n+1) [4n + 9] \quad (3)$$

$$4n^2 + 13n - 627 = 0 \quad (4)$$

On solving this quadratic equation, we get roots
 $n = -12.5$ and $n = 11$

Since we are looking for positive terms of n ,
we remove the negative root

$$\Rightarrow n = 11 \quad (5)$$

\therefore the total number of terms are 12

The Z-Transform of the above question is

$$X(z) = \frac{9}{1 - z^{-1}} + \frac{8z^{-1}}{(1 - z^{-1})^2} \quad (6)$$

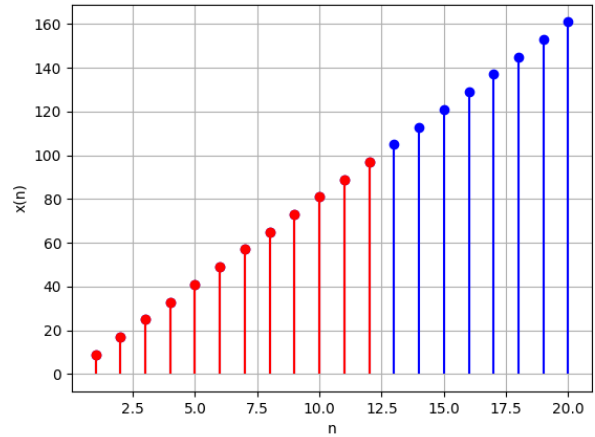


Fig. 0. Plot of $x(n)$ vs n