NCERT 10.5.2 17Q

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Question: Find the 20th term from the last term of the AP: $3, 8, 13.....253$.

Solution:

As the 20th term is considered from last,

Parameter	Description	Value
$x(0)$	first term	3
d	common difference	8 - 3 = 5
$x(n)$	$(N + 1)^{th}$ term	$(x(0) + nd)u(n)$
$u(n)$	unit step function	
$x(N - n)$	$(n + 1)^{th}$ term from last	$x(0) + (N - n)d$

TABLE 1: Input table

From Table 1:

$$x(n) = x(0) + nd \tag{1}$$

$$253 = 3 + 5n \tag{2}$$

$$250 = 5n \tag{3}$$

$$n = 50 \tag{4}$$

From Table 1:

$$x(N - n) = x(0) + (N - n)d \tag{5}$$

$$x(N - 19) = 3 + (50 - 19)(5) \tag{6}$$

$$= 3 + 155 \tag{7}$$

$$= 158 \tag{8}$$

Fig. 1

From equation (**??**) and (**??**): Z-Transform of $x(N)$:

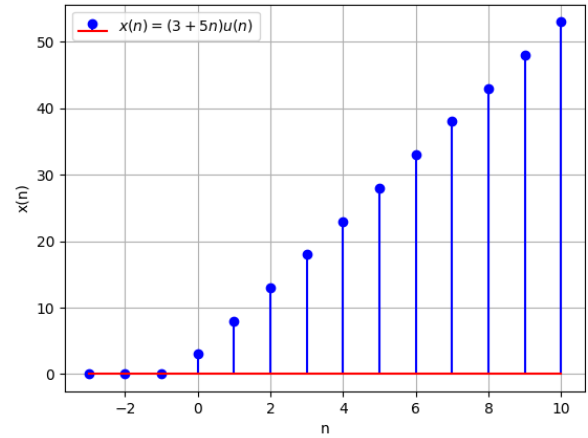$$X(z) = \frac{3}{1 - z^{-1}} + \frac{5z^{-1}}{(1 - z^{-1})^2}; \{z \in \mathbb{C} : |z| > 1\} \tag{9}$$