Arithmetic Progression Problem

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Which term of the arithmetic progression (AP): $3, 8, 13, 18, \ldots$ is 78?

1 Input Table:

Parameters	Value	Description
$x(0)$	3	Initial Term
d	5	Common Difference
$x(k)$	78	Target Term
k	?	Target Term Number

2 Solution:

Let $x(n)$ be the general term of AP where $(n+1)th$ term of AP is found by $x(n)$.
Let's solve the problem:

$$x(n) = x(0) + (n)d \tag{1}$$
$$\text{Let } x(n) = [3 + (n)5] \times u(n) \tag{2}$$
$$x(k) = [3 + (k)5] \times u(k) \tag{3}$$
$$\text{Substitute values into the formula:} \tag{4}$$
$$78 = 3 + (k) \times 5 \tag{5}$$
$$75 = (k) \times 5 \tag{6}$$
$$k = 15 \tag{7}$$

As $(k+1)th$ term is $x(k)$, 78 is the 16th term of the AP.

3 Z-Transform:

Let the Z-transform of $x(n)$ be $X(z)$.

$$X(z) = \frac{3 + 2 \times z^{-1}}{(1 - z^{-1})^2} \quad \text{for all } |z| > 1 \tag{8}$$