

# NCERT Mathematics 10.5.2 Q10

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**Question:** The 17th term of an AP exceeds its 10th term by 7. Find the common difference.

**Solution:**

Parameter	Value
First term of AP	$x(0)$
Common difference of AP	$d$
$x(16) - x(9)$	$7$

Using the formula for the  $n$ th term of an AP ( $x(n) = x(0) + (n)d$ ), where  $(x(n))$  represents the  $(n + 1)$ th term of an arithmetic progression (AP)

$$x(16) = x(0) + 16d \quad (1)$$

$$x(9) = x(0) + 9d \quad (2)$$

$$(x(0) + 16d) - (x(0) + 9d) = 7 \quad (3)$$

$$7d = 7 \quad (4)$$

$$d = 1 \quad (5)$$

Now,

$$f(n) = x(n) \cdot u(n) = (x(0) + nd)u(n) \quad (6)$$

The  $z$ -transform of  $u(n)$  is given by

$$F(z) = \sum_{n=-\infty}^{\infty} f(n)z^{-n} \quad (7)$$

$$F(z) = \sum_{n=-\infty}^{\infty} (x(0) + nd)u(n)z^{-n} \quad (8)$$

$$F(z) = \sum_{n=0}^{\infty} (x(0) + nd)z^{-n} \quad (9)$$

$$F(z) = x(0) \cdot \frac{1}{1 - z^{-1}} + d \cdot \frac{z^{-1}}{(1 - z^{-1})^2}; ROC : |z| > 1 \quad (10)$$