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	Description	Value
d	Common difference of AP	?
x(n)	(n+1)th term of AP	$(x(0) + (n)\,d)u(n)$
x(16) - x(9)	The difference between 17th and 10th term of AP	7

$$(x(0) + 16d) - (x(0) + 9d) = 7 \tag{1}$$

$$\implies d = 1 \tag{2}$$

$$y(n) = x(n) * u(n) \tag{3}$$

$$Y(z) = X(z) \cdot U(z) \tag{4}$$

$$\implies Y(z) = \left(x(0) \cdot \frac{1}{1 - z^{-1}} + \frac{z^{-1}}{(1 - z^{-1})^2} \right) \frac{1}{(1 - z^{-1})}; \quad |z| > 1 \tag{5}$$

$$\implies Y(z) = \frac{x(0)}{(1 - z^{-1})^2} + \frac{z^{-1}}{(1 - z^{-1})^3}; \quad |z| > 1 \tag{6}$$