

NCERT 11.9.3 28Q

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Question: The sum of two numbers is 6 times their geometric mean, show that num-

bers are in the ratio $\frac{(3 + 2\sqrt{2})}{(3 - 2\sqrt{2})}$.

Solution: Let the two numbers be $x(0)$ and $x(2)$ such that $x(2) \geq x(0)$

Parameter	Description	Value
$x(0)$	first number	
r	common ratio	
$x(2)$	second number	$x(0)r^2$
$x(1)$	G.M	$x(0)r$
$x(n)$	$(n+1)^{th}$ term	$(x(0)r^n)u(n)$

TABLE 1: Input table

From Table 1:

$$x(0) + x(2) = 6x(1) \quad (1)$$

$$\Rightarrow x(0) + x(0)r^2 = 6x(0)r \quad (2)$$

$$\Rightarrow r^2 - 6r + 1 = 0 \quad (3)$$

$$\Rightarrow r = 3 \pm 2\sqrt{2} \quad (4)$$

$$\therefore \frac{x(2)}{x(0)} = (3 + 2\sqrt{2})^2 \quad (5)$$

$$= \frac{(3 + 2\sqrt{2})}{(3 - 2\sqrt{2})} \quad (6)$$

$$x(n) = (x(0)(3 + 2\sqrt{2})^n)u(n) \quad (7)$$

Taking z - Transform of $x(n)$:

$$X(z) = \frac{x(0)}{1 - (3 + 2\sqrt{2})z^{-1}} \quad (8)$$

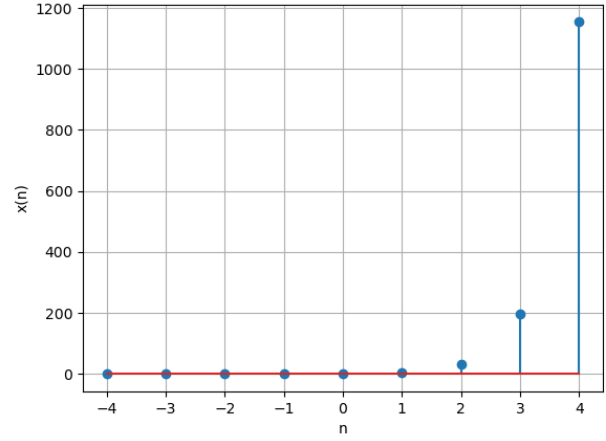


Fig. 1