

Sequence(19) 10.5.3

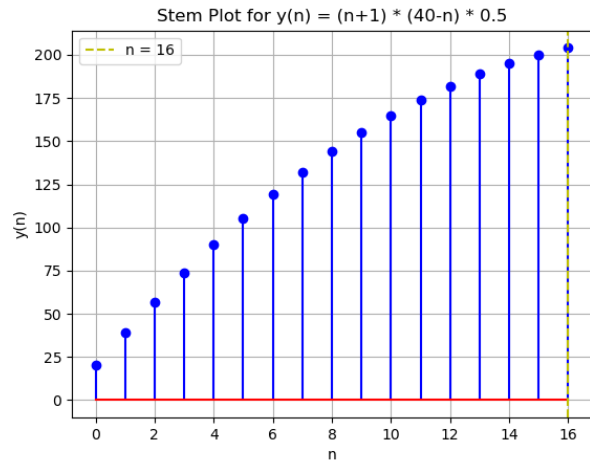
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Question :-

200 logs are stacked in the following manner: 20 logs in the bottom row, 19 in the next row, 18 in the row next to it and so on . In how many rows are the 200 logs placed and how many logs are in the top row?

Symbol	Description	Value
$x(0)$	bottom row	20
d	common difference	-1
$y(n)$	total number of logs	200
$x(n)$	number of logs in n row	depends on n

TABLE I



For an Arithmetic Progression :-

$$x(n) = [x(0) + nd] u(n) \quad (1)$$

$$x(n) = [20 - n] u(n) \quad (2)$$

$$X(z) = \frac{20 - 21z^{-1}}{(1 - z^{-1})^2} \quad |z| > 1 \quad (3)$$

$$200 = \frac{1}{2} [20(n+2)(n+1) - 21(n)(n+1)] \quad (4)$$

$$n = 15, 24 \quad (5)$$

$$x(n) > 0 \quad (6)$$

Using equation (2)

$$x(15) = 5 \quad (7)$$

$$x(24) = -4 \quad (8)$$

$x(24)$ is rejected because it is negative

$$x(15) = 5 \quad (9)$$