Q: Determine the AP whose third term is 16 and the 7th term exceeds the 5th term by 12.

Solution:

Parameter	Value	Description
$x(6) - x(4)$	12	7th term exceeds 5th by 12
$x(2)$	16	Third term
d	?	Common difference
$x(0)$	?	First term of AP
$x(n)$	$(x(0) + nd)u(n)$	General term

TABLE I
INPUT PARAMETERS TABLE

From Table I

$$x(0) + 6d - x(0) - 4d = 12 \tag{1}$$
$$\implies 2d = 12 \tag{2}$$
$$\implies d = 6 \tag{3}$$

Also,

$$x(0) + 2d = 16 \tag{4}$$
$$\implies x(0) + 2(6) = 16 \tag{5}$$
$$\implies x(0) = 4 \tag{6}$$
$$\therefore x(n) = 6n + 4 \tag{7}$$

From Table I

$$X(z) = x(0)\frac{1}{1 - z^{-1}} + d\frac{z^{-1}}{(1 - z^{-1})^2} \tag{8}$$
$$= 4\frac{1}{1 - z^{-1}} + 6\frac{z^{-1}}{(1 - z^{-1})^2} \tag{9}$$
$$= \frac{4 + 2z^{-1}}{(1 - z^{-1})^2} \quad |z| > 1 \tag{10}$$

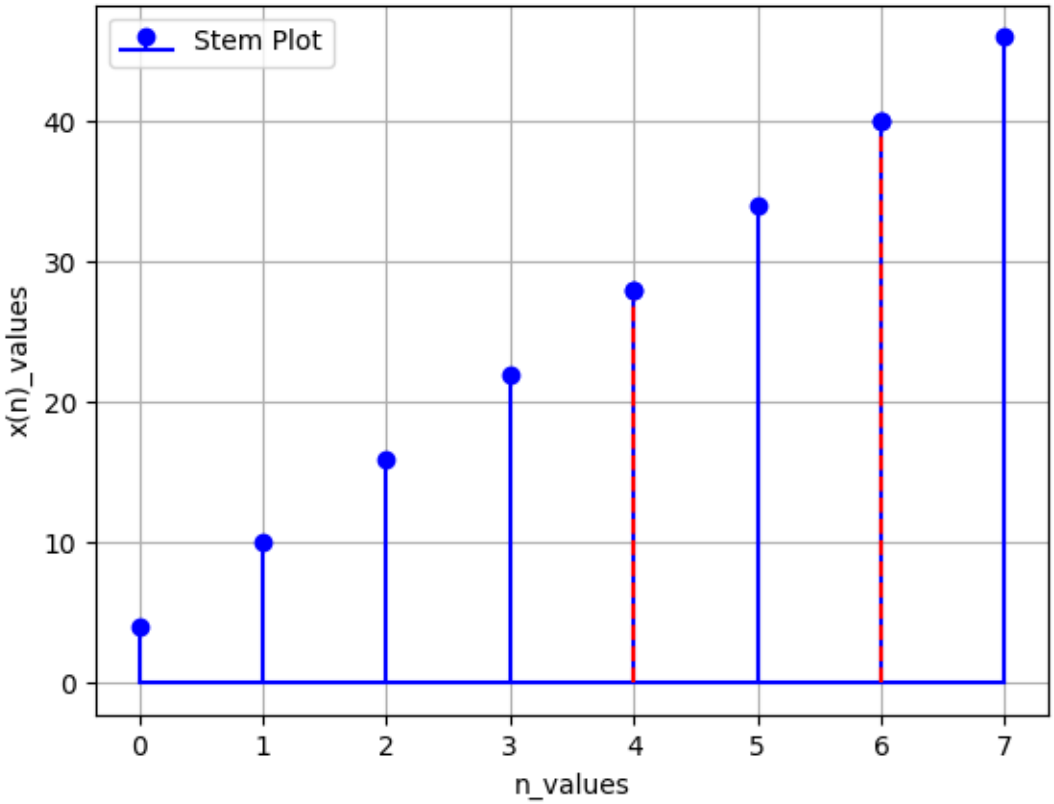

Fig. 1. Given AP