10.5.4-5

EE23BTECH11033-killana jaswanth

Question:
A small terrace at a football ground comprises of 15 steps each of which is 50 m long and built of solid concrete.Each step has a rise of 1/4 m and a tread of 1/2 m. Calculate the total volume of concrete required to build the terrace. [Hint: Volume of concrete required to build the first step=

$$volume = 1/4 \cdot 1/2 \cdot 50 \tag{1}$$

solution

parameter for step one	value
length	50
breadth	0.25
height	0.5
volume	6.25

=The height difference between any 2 consecutive steps is 0.25 m.
=So, the volume of the second step is $(50m)(5m)(0.5m)= 12.5m^3$ and third is $18.75m^3$

$$S_n = \frac{n+1}{2}[2a + (n)d] \tag{2}$$

$$n = 0, 1, 2, 3, ... \tag{3}$$

here

parameter	value	measurement
a	6.25	first term
d	6.25	common diffrence
n	14	no of terms from 0

$$\tag{4}$$

$$S_n = \frac{14+1}{2}[12.5 + (14)6.25] \tag{5}$$

$$S_n = \frac{15}{2}[12.5(14)6.25] \tag{6}$$

$$S_n = \frac{15}{2}[12.5 + 87.5] \tag{7}$$

$$volume = (7.5) \cdot 100 = 750m^3 \tag{8}$$

plot of x(n) and n

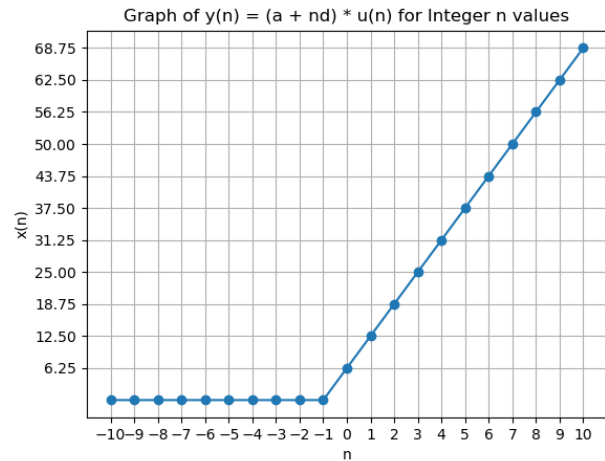$$x(n) = (a + n \cdot d) \cdot u(n) \tag{9}$$

Fig. 1

$$\tag{10}$$

$$x(n) \xleftrightarrow{Z} X(Z) \tag{11}$$

$$x(n) = (a + nd)u(n) \tag{12}$$

$$X(Z) = \sum_{-\infty}^{\infty} x(n)Z^{-n} \tag{13}$$

$$= \sum_{-\infty}^{\infty} (a + nd)u(n)Z^{-n} \tag{14}$$

$$= 0 + \sum_{0}^{\infty} (a + nd)Z^{-n} \tag{15}$$

$$= \frac{x(0)}{1 - z^{-1}} + \frac{dz^{-1}}{(1 - z^{-1})^2} , |z| > |r| \tag{16}$$

$$= \frac{6.25}{1 - z^{-1}} + \frac{6.25z^{-1}}{(1 - z^{-1})^2} , |z| > |r| \tag{17}$$