

SEQUENCE AND SERIES

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Find the sum of first 51 terms of an AP whose second and third terms are 14 and 18 respectively.

Solution:

Variable	Description	Value
$x(n)$	n^{th} term of sequence	$(4n + 10)u(n)$

TABLE 0

INPUT PARAMETERS

Sum of n terms of AP is given by

$$x(n) = (4n + 10)u(n) \quad (1)$$

$$y(n) = x(n) * u(n) \quad (2)$$

$$u(n) \xleftrightarrow{Z} \frac{1}{(1 - z^{-1})} \quad |z| > 1 \quad (3)$$

$$nu(n) \xleftrightarrow{Z} \frac{z^{-1}}{(1 - z^{-1})^2} \quad |z| > 1 \quad (4)$$

$$n^2u(n) \xleftrightarrow{Z} \frac{z^{-1}(1 + z^{-1})}{(1 - z^{-1})^3} \quad |z| > 1 \quad (5)$$

$$n^3u(n) \xleftrightarrow{Z} \frac{z^{-1}(1 + 4z^{-1} + z^{-2})}{(1 - z^{-1})^4} \quad |z| > 1 \quad (6)$$

$$\Rightarrow X(z) = \frac{(4z^{-1})}{(1 - z^{-1})^2} + \frac{10}{(1 - z^{-1})} \quad |z| > 1 \quad (7)$$

$$Y(z) = X(z)U(z) \quad (8)$$

$$\Rightarrow Y(z) = \frac{(4z^{-1})}{(1 - z^{-1})^3} + \frac{10}{(1 - z^{-1})^2} \quad |z| > 1 \quad (9)$$

Now from (3), (4), (5), (6), (9) By using Contour Integration,

$$y(n) = (2n(n + 1) + 10(n + 1))u(n) \quad (10)$$

\therefore Sum of n terms of the series whose n^{th} term is given by $(4n + 10)u(n)$ is $(2n(n + 1) + 10(n + 1))u(n)$

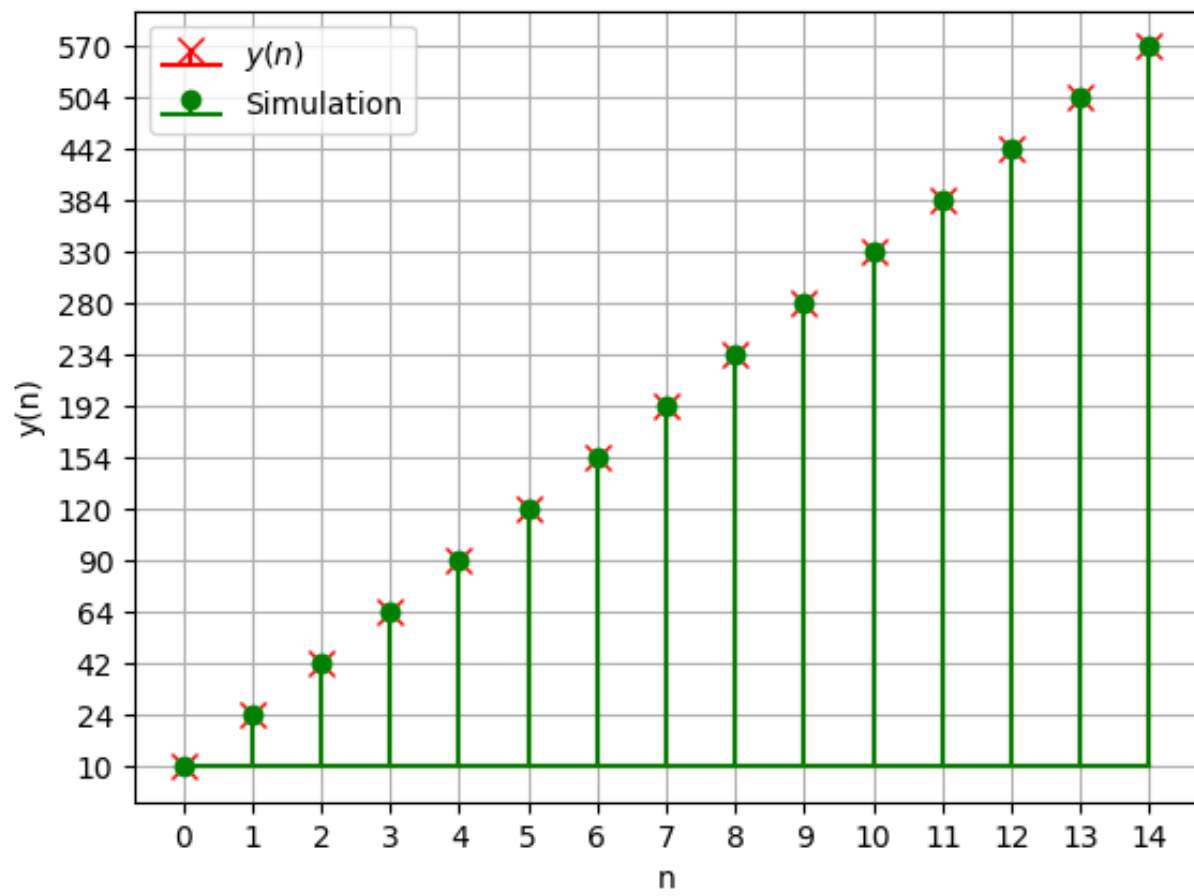


Fig. 0. Theory vs Simulation