Assignment

11.9.5 - 22

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Question

Find the 20th term in this series.

$$2 \times 4 + 4 \times 6 + 6 \times 8 \cdots + n \, terms$$

Solution:

Symbol	Value	Description
x(0)	8	First term of the series
x(n)	$4(n+1)(n+2)u(n)$	$(n+1)^{th}$ term of the series

TABLE 0
Table of parameters

To find 20^{th} term of the series put n=19 ,

$$x(19) = 4 * 20 * 21 \tag{1}$$

$$x(19) = 1680 \tag{2}$$

Using Z- transform,

$$n^2 u(n) \overset{Z}{\leftrightarrow} \frac{z^{-1}\left(z^{-1}+1\right)}{\left(1-z^{-1}\right)^3}, |z| > 1 \tag{3}$$

$$nu(n) \overset{Z}{\leftrightarrow} \frac{z^{-1}}{\left(1-z^{-1}\right)^2}, |z| > 1 \tag{4}$$

$$u(n) \overset{Z}{\leftrightarrow} \frac{1}{\left(1-z^{-1}1\right)}, |z| > 1 \tag{5}$$

$$X(z) = \sum_{n=-\infty}^{n=\infty} 4(n+1)(n+2)\,u(n)\,z^{-n} \tag{6}$$

$$X(z) = \sum_{n=-\infty}^{n=\infty} 4\left(n^2+3n+2\right)u(n)\,z^{-n} \tag{7}$$

$$X(z) = \frac{8}{\left(1-z^{-1}\right)^3}, |z| > 1 \tag{8}$$