EE23BTECH11024 - G.Karthik Yadav*

Exercise 9.1

1. Write the first five terms of the sequence
$a_n = n\,(n+2)$

Solution:

Symbol	Parameters	value
$u\,(n)$	unit step function	
$x\,(n)$	general term of the series	$(n+1)\,(n+3)\,u\,(n)$
$X\,(z)$	Z-transform of x(n)	?

TABLE I
Input Parameters

$$x\,(0) = (0+1)\,(0+3) = 3 \tag{1}$$
$$x\,(1) = (1+1)\,(1+3) = 8 \tag{2}$$
$$x\,(2) = (2+1)\,(2+3) = 15 \tag{3}$$
$$x\,(3) = (3+1)\,(3+3) = 24 \tag{4}$$
$$x\,(4) = (4+1)\,(4+3) = 35 \tag{5}$$

$$x\,(n)\,ZX\,(z) \tag{6}$$

$$X\,(z) = \sum_{n=-\infty}^{\infty} x\,(n)\,z^{-n} \tag{7}$$
$$= \sum_{n=-\infty}^{\infty} (n+1)\,(n+3)\,u\,(n)\,z^{-n} \tag{8}$$
$$\implies X\,(z) = \frac{3 - z^{-1}}{(1-z^{-1})^3}\,, \qquad |z| > 1 \tag{9}$$

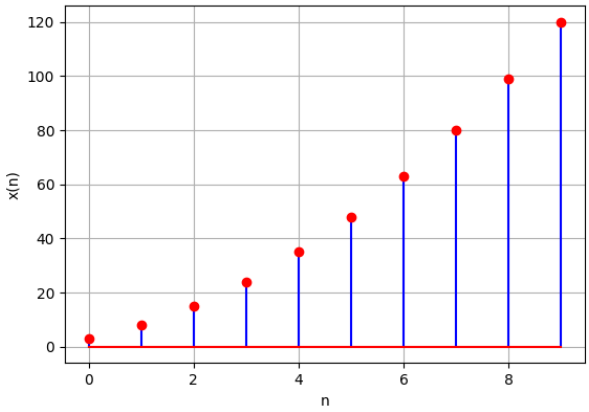

Fig. 1. Plot of x(n) vs n