

Assignment-3

EE:1205 Signals and systems
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I. QUESTION 1.2.4

$$1 \times 2 \times 3 + 2 \times 3 \times 4 + 3 \times 4 \times 5 + \dots$$

II. SOLUTION

$$X(z) = \sum_{n=-\infty}^{\infty} x(n) z^{-n} \quad (1)$$

$$= \sum_{n=-\infty}^{\infty} (n^3 + 3n^2 + 2n) u(n) z^{-n} \quad (2)$$

Using results of z-transform:

$$\therefore X(z) = \frac{6z^{-1}}{(1 - z^{-1})^4}, |z| > 1 \quad (3)$$

We know:

$$y_1(n) = x_1(n) * u(n) \quad (4)$$

$$Y_1(z) = X_1(z) U(z) \quad (5)$$

$$= \frac{6z^{-1}}{(1 - z^{-1})^5}, |z| > 1 \quad (6)$$

Now we take the inverse z-transform of this equation.

On solving we get:

$$y(n) = \frac{n(n+1)(n+2)(n+3)}{4} \quad (7)$$

Hence the sum of n terms of the above series is

$$y(n) = \frac{n(n+1)(n+2)(n+3)}{4}$$