

18101064

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Here,

$$a = 1$$

$$b = 1 \quad \left[\begin{array}{cc} (x_1, x_1) \text{ v.o.s.} & (x_1, x_2) \text{ v.o.s.} \\ (x_2, x_1) \text{ v.o.s.} & (x_2, x_2) \text{ v.o.s.} \end{array} \right] = 0$$

$$c = 5$$

$$d = 1$$

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i = \frac{1}{4} (1+5+5+1) = 3$$

Ans to the Que No. 1

① Dataset: $(1, 4), (5, 1), (5, 6), (1, 1)$

$$x \quad 1 \quad 5 \quad 5 \quad 1$$

$$y \quad 4 \quad 1 \quad 6 \quad 1$$

② Calculate the ^{Mean} features of features:

$$\bar{x} = \frac{1}{4} (1+5+5+1) = 3$$

$$\bar{y} = \frac{1}{4} (4+1+6+1) = 3$$

(iv) Covariance Matrix:

$$C = \begin{bmatrix} \text{cov}(x, x) & \text{cov}(x, y) \\ \text{cov}(y, x) & \text{cov}(y, y) \end{bmatrix}$$

$$\text{cov}(x, x) = \frac{1}{N-1} \sum_{k=1}^N (x_{1k} - \bar{x})^2$$

$$= \frac{1}{3} \{ (1-3)^2 + (5-3)^2 + (5-3)^2 + (1-3)^2 \}$$

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

$$= \frac{1}{3} \times 16$$

$$= 5.33$$

$$s = (1+2+2+1) \cdot \frac{1}{4} = 5$$

$$s = (1+0+1+1) \cdot \frac{1}{4} = 5$$

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$$\text{cov}(X, Y) = \frac{1}{N-1} \sum_{k=1}^N (x_k - \bar{x})(y_k - \bar{y})$$

$$= \frac{1}{4-1} \{ (1-3)(4-3) + (5-3)(1-3) + (5-3)(6-3) + (1-3)(1-3) \}$$

$$= \frac{1}{3} \{ (-2) + (-4) + 6 + 4 \}$$

$$= 1.33$$

$$\text{cov}(Y, X) = \frac{1}{N-1} \sum_{k=1}^N (y_k - \bar{y})(x_k - \bar{x})$$

$$= 1.33$$

$$\text{cov}(Y, Y) = \frac{1}{N-1} \sum_{k=1}^N (Y_k - \bar{Y})^2 = \frac{1}{N-1} \sum_{k=1}^N (Y_k^2 - 2Y_k\bar{Y} + \bar{Y}^2)$$

$$= \frac{1}{3} \left\{ (4-3)^2 + (1-3)^2 + (6-3)^2 + (1-3)^2 \right\}$$

$$= \frac{1}{3} \times 18$$

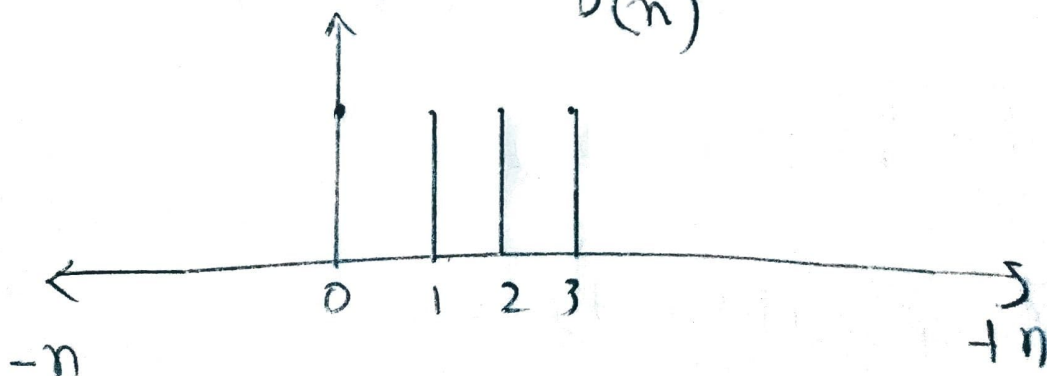
$$= 6$$

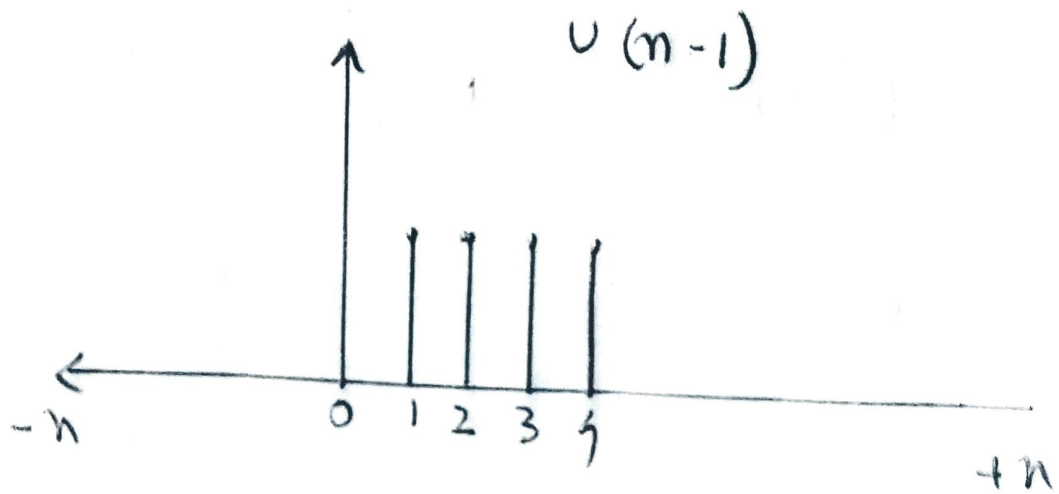
Que. No: 2

①

Unit Step Signal: $u(n) = \begin{cases} 1, & n \geq 0 \\ 0, & n < 0 \end{cases}$

$$u(n) = \begin{cases} 1, & n \geq 0 \\ 0, & n < 0 \end{cases}$$





⑪

$$u(n+c)$$

$$= u(n+5)$$

$$u(n) = \begin{cases} 1, & n \geq 0 \\ 0, & n < 0 \end{cases}$$

