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Lab 1

Task 1

$$A = \begin{bmatrix} 1 & 0 \\ 0 & 3 \end{bmatrix} \quad B = \begin{bmatrix} 4 & 0 & 1 \\ 0 & 2 & -1 \end{bmatrix} \quad D = \begin{bmatrix} 1 & 2 \end{bmatrix}$$

1- $(DB)^T$

$$DB = [1 2] \begin{bmatrix} 4 & 0 & 1 \\ 0 & 2 & -1 \end{bmatrix} = [4 \ 4 \ -1]$$

$$\therefore (DB)^T = \begin{bmatrix} 4 \\ 4 \\ -1 \end{bmatrix}$$

2- AD

$$AD = \begin{bmatrix} 1 & 0 \\ 0 & 3 \end{bmatrix} \begin{bmatrix} 1 & 2 \end{bmatrix} = \begin{bmatrix} 1 & 2 \\ 0 & 6 \end{bmatrix}$$

3- $BA + DT$

$$BA = \begin{bmatrix} 4 & 0 & 1 \\ 0 & 2 & -1 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \\ 3 \end{bmatrix} = \begin{bmatrix} 7 \\ -3 \end{bmatrix}$$

$$BA + DT = \begin{bmatrix} 7 \\ -3 \end{bmatrix} + \begin{bmatrix} 1 \\ 2 \end{bmatrix} = \begin{bmatrix} 8 \\ -1 \end{bmatrix}$$

4- $B^T D^T = (BD)^T$

$$\begin{bmatrix} 4 & 0 & 1 \\ 0 & 2 & -1 \end{bmatrix}^T \begin{bmatrix} 1 \\ 2 \end{bmatrix}^T = \begin{bmatrix} 4 \\ -1 \end{bmatrix}$$

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Task 2

$$A = \begin{bmatrix} 1 & 3 & 5 \\ 2 & 2 & 4 \\ 6 & 5 & 1 \end{bmatrix}, B = \begin{bmatrix} 4 & 3 \\ 2 & 3 \\ 1 & 1 \end{bmatrix}$$

$$1 - AB = \begin{bmatrix} 15 & 17 \\ 36 & 31 \\ 35 & 34 \end{bmatrix}$$

$$2 - A^T B = \begin{bmatrix} 1 & 7 & 6 \\ 3 & 2 & 5 \\ 5 & 4 & 1 \end{bmatrix} \begin{bmatrix} 4 & 3 \\ 2 & 3 \\ 1 & 1 \end{bmatrix} = \begin{bmatrix} 24 & 30 \\ 21 & 20 \\ 29 & 28 \end{bmatrix}$$

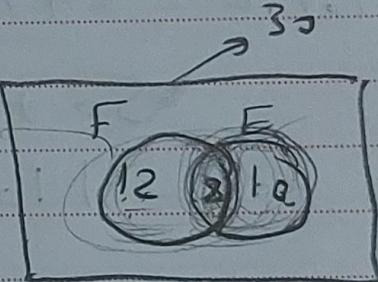
$$3 - A^{-1} I = A = \begin{bmatrix} 1 & 3 & 5 \\ 3 & 2 & 4 \\ 6 & 5 & 1 \end{bmatrix}$$

Task 3

No of students = 30

8 → English, French

18 → English



$$E \cap F = 8$$

$$E_{\text{total}} = 18 \quad \left. \right\} \quad \therefore E_{\text{only}} = 18 - E \cap F \\ = 18 - 8 = 10$$

$$F_{\text{total}} = 30 - 10 = 20$$

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Task 4

50 → Cricket

50 → Hockey

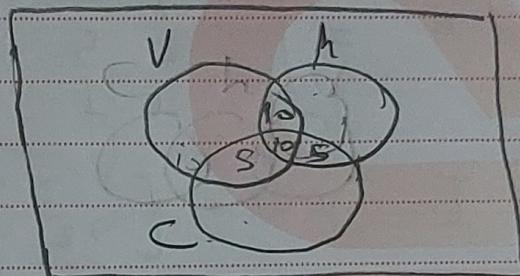
40 → VolleyBall

$$C \cap h = 5$$

$$h \cap V = 10$$

$$C \cap V = 5$$

$$C \cap V \cap h = 10$$



$$\text{Total} = C + H + V - (C \cap h + V \cap h + C \cap V - C \cap h \cap v)$$

$$50 + 50 + 40 - (5 + 10 + 5 - 10)$$

$$= 140 - 10 = 130 \text{ Students}$$

$$C_{\text{only}} = 50 - 5 - 5 + 10$$

$$= 50 - 10 = 40$$

$$h_{\text{only}} = 50 - 10 - 5 + 10$$

$$= 45$$

$$V_{\text{only}} = 40 - 5 - 10 + 10$$

$$= 35$$

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⇒ Suppose we draw two cards out of a deck
of 52

$$P(\text{both Spades}) = \frac{13}{52} \times \frac{12}{51} = \frac{1}{4} \times \frac{12}{51} = \frac{3}{51} = \frac{1}{17}$$

 ≈ 0.0588

⇒ If the first ball is red

$$P = \frac{15}{34} \times \frac{14}{33} = \frac{2}{21}$$

⇒ If the first one is black

$$P = \frac{15}{34} \times \frac{5}{14} = \frac{5}{21}$$

$$\left\{ \begin{array}{l} P = \frac{5}{21} + \frac{2}{21} = \frac{7}{21} = \frac{1}{3} \\ \text{red} \\ \text{second} \end{array} \right.$$