

Assignment -2 in L^AT_EX

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Question 10.13.1.26: A school has five houses A, B, C, D and E. A class has 23 students, 4 from house A, 8 from house B, 5 from house C, 2 from house D and rest from house E. A single student is selected at random to be the class monitor. The probability that the selected student is not from A, B and C is

Solution: Total no of students=23

House	A	B	C	D	E
Students	4	8	5	2	4

TABLE 0: Student distribution in each house

With reference to Table. 0

$$\begin{aligned} \Pr(A) &= \frac{4}{23}, \Pr(B) = \frac{8}{23}, \Pr(C) = \frac{5}{23} \\ \Pr(D) &= \frac{2}{23}, \Pr(E) = \frac{4}{23} \end{aligned} \quad (1)$$

W=student selected is not from A,B and C

$$\implies W = A'B'C' \quad (2)$$

By DeMorgan's Law and Axiom 3 of probability

$$\Pr(A'B'C') = \Pr((A + B + C)') \quad (3)$$

$$\Pr((A + B + C)') = 1 - \Pr((A + B + C)) \quad (4)$$

$$\Pr(A + B + C) = \Pr(A) + \Pr(B) + \Pr(C) \quad (5)$$

$$\Pr(A + B + C) = \frac{4}{23} + \frac{8}{23} + \frac{5}{23} = \frac{17}{23} \quad (6)$$

$$\Pr(A'B'C') = 1 - \frac{17}{23} = \frac{6}{23} \quad (7)$$

Therefore, probability of not selecting a student from A,B and C is,

$$\Pr(W) = \frac{6}{23} \quad (8)$$