Assignment -2 in LaTeX

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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

A	B	C	D	E
4	8	5	2	4

TABLE 0: Student distribution in each house

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

$$\implies W = A'B'C' \tag{1}$$

By DeMorgan's Law and Axiom 3 of probability

$$p_X\left(A'B'C'\right) = p_X\left((A+B+C)'\right) \tag{2}$$

$$p_X\left((A+B+C)'\right) = 1 - p_X\left((A+B+C)\right) \tag{3}$$

$$p_X\left(A+B+C\right) = p_X\left(A\right) + p_X\left(B\right) + p_X\left(C\right) \tag{4}$$

With reference to Table. 0

$$p_X\left(A\right) = \frac{4}{23}, p_X\left(B\right) = \frac{8}{23}, p_X\left(C\right) = \frac{5}{23} \tag{5}$$

$$p_X\left(A+B+C\right) = \frac{4}{23} + \frac{8}{23} + \frac{5}{23} \tag{6}$$

$$= \frac{17}{23} \tag{7}$$

$$p_X\left(A'B'C'\right) = 1 - \frac{17}{23} = \frac{6}{23} \tag{8}$$

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

$$p_X\left(W\right) = \frac{6}{23} \tag{9}$$