

**NAMALWA MILLIA**

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**Question 1:**

**A professor thinks students who live on campus are more likely to get As in the probability course. To check this theory, the professor combines the data from the past few years. 600 students have taken the course, 120 students have gotten As, 200 students lived on campus, 80 students lived off campus and got As.**

**SOLUTIONS**

**(a). Does this data suggest that "getting an A" and "living on campus" are dependent or independent?**

To determine whether the events "getting an A" and "living on campus" are dependent or independent, we need to calculate the conditional probability  $P(A|B)$ , where A represents getting an A and B represents living on campus.

$$P(A|B) = P(A \text{ and } B) / P(B)$$

$P(A \text{ and } B)$  is the probability of getting an A and living on campus. This is given as 80 students.

$P(B)$  is the probability of living on campus. This is given as 200 students.

Therefore,  $P(A|B) = 80/200 = 0.4$

Since  $P(A|B)$  is not equal to  $P(A)$ , we can conclude that the events "getting an A" and "living on campus" are dependent.

**(b). If events A and B are independent. What is the condition for two events A and B, to be independent?**

Two events A and B are independent if and only if  $P(A|B) = P(A)$ . This means that the probability of event A occurring does not depend on whether event B has occurred or not.

## **Question 2:**

**Suppose that I want to purchase a smart phone. I can choose either a large or a small screen; a 64GB, 128GB, or 256GB storage capacity, and a black or white cover.**

### **SOLUTIONS**

#### **a) How many different options do I have?**

To determine the number of different options for choosing a smart phone, we need to consider the number of choices for each feature and multiply them together.

Screen size: 2 choices (large or small)

Storage capacity: 3 choices (64GB, 128GB, or 256GB)

Cover color: 2 choices (black or white)

Therefore, the total number of different options is  $2 * 3 * 2 = 12$ .

#### **(b) What are these options?**

The 12 different options are:

1. Large screen, 64GB, black cover
2. Large screen, 64GB, white cover
3. Large screen, 128GB, black cover
4. Large screen, 128GB, white cover
5. Large screen, 256GB, black cover
6. Large screen, 256GB, white cover
7. Small screen, 64GB, black cover
8. Small screen, 64GB, white cover
9. Small screen, 128GB, black cover
10. Small screen, 128GB, white cover
11. Small screen, 256GB, black cover
12. Small screen, 256GB, white cover