

CLASS 12

MATHEMATICS

EXTRA QUESTIONS

Class 12 Mathematics Chapter 13 Probability – Extra Questions with Answers

This set of Probability questions moves from conditional probability and independence through to the binomial distribution and the variance of a random variable.

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This set of Probability questions moves from conditional probability and independence through to the binomial distribution and the variance of a random variable.

Very Short Answer Questions (1 mark)

Q1. Write the formula for $P(A|B)$.

Ans: $P(A \cap B)/P(B)$, $P(B) > 0$.

Q2. What is the condition for independence of A and B?

Ans: $P(A \cap B) = P(A)P(B)$.

Q3. Write the binomial probability formula for r successes in n trials.

Ans: $P(X=r) = {}^nC_r p^r q^{n-r}$.

Q4. What is the sum of all probabilities in a probability distribution?

Ans: 1.

Q5. Write the formula for variance of a random variable X.

Ans: $\text{Var}(X) = E(X^2) - [E(X)]^2$.

Short Answer Questions (2–3 marks)

Q6. If $P(A)=0.4$, $P(B)=0.5$, $P(A \cap B)=0.2$, find $P(A|B)$.

Ans: $P(A|B) = P(A \cap B)/P(B) = 0.2/0.5 = 0.4$.

Q7. A fair coin is tossed 3 times. Find the probability of getting exactly 2 heads.

Ans: $n=3$, $p=q=1/2$, $r=2$. $P(X=2) = {}^3C_2 (1/2)^2 (1/2)^1 = 3(1/4)(1/2) = 3/8$.

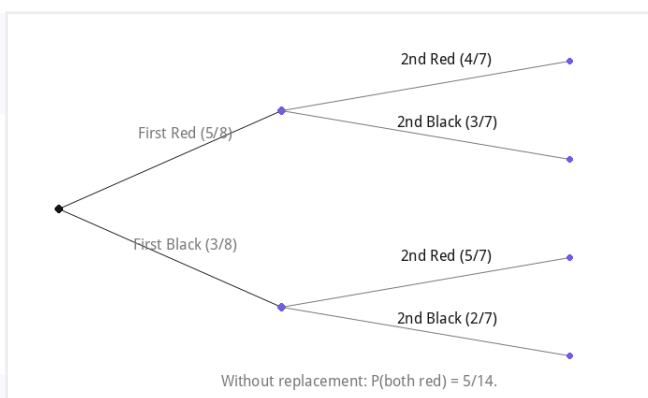
Q8. Check if events A, B with $P(A)=0.3$, $P(B)=0.4$, $P(A \cap B)=0.12$ are independent.

Ans: $P(A)P(B) = 0.3 \times 0.4 = 0.12 = P(A \cap B)$. Yes, they are independent.

Higher-Order Thinking / Application Questions

Q9. A bag contains 5 red and 3 black balls. Two balls are drawn one after another without replacement. Find the probability that the second ball is red, given the first ball drawn was black, and also find the overall probability that both balls are red.

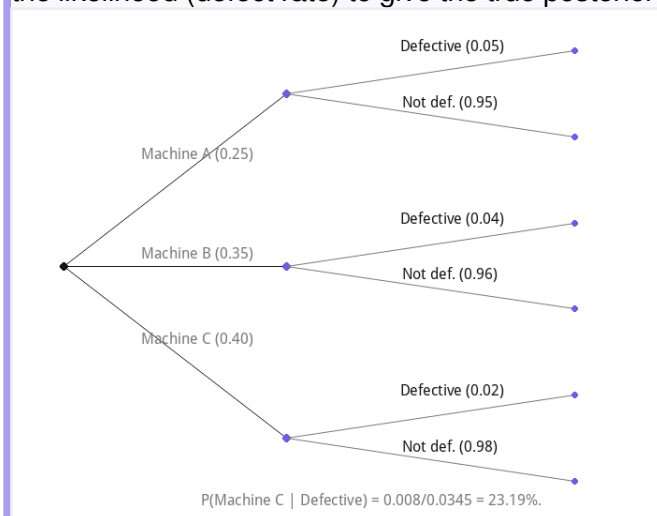
Ans: Total balls = 8 (5 red, 3 black). Given the first ball is black (3 black balls, so $P(\text{first black}) = 3/8$), after removing one black ball, 7 balls remain: 5 red, 2 black. So $P(\text{second is red} | \text{first is black}) = 5/7$. For the second part, probability that both balls are red: $P(\text{first red}) = 5/8$. Given first is red, 7 balls remain: 4 red, 3 black, so $P(\text{second red} | \text{first red}) = 4/7$. By the multiplication theorem, $P(\text{both red}) = P(\text{first red}) \times P(\text{second red} | \text{first red}) = (5/8) \times (4/7) = 20/56 = 5/14$. This demonstrates conditional probability changing as balls are removed without replacement (sampling without replacement), unlike independent trials with replacement.



where probabilities would stay constant.

Q10. Three machines A, B, C produce 25%, 35%, and 40% of a factory's total output respectively. Their defect rates are 5%, 4%, and 2% respectively. If a randomly selected item is found defective, find the probability it was produced by machine C, using Bayes theorem.

Ans: Let E_1, E_2, E_3 denote the item being from machines A, B, C respectively, with $P(E_1)=0.25$, $P(E_2)=0.35$, $P(E_3)=0.40$. Let D denote the event the item is defective, with $P(D|E_1)=0.05$, $P(D|E_2)=0.04$, $P(D|E_3)=0.02$. First find $P(D)$ using the law of total probability: $P(D)=P(E_1)P(D|E_1)+P(E_2)P(D|E_2)+P(E_3)P(D|E_3)=(0.25)(0.05)+(0.35)(0.04)+(0.40)(0.02)=0.0125+0.014+0.008=0.0345$. Now apply Bayes theorem to find $P(E_3|D)$: $P(E_3|D)=[P(E_3)P(D|E_3)]/P(D)=(0.40)(0.02)/0.0345=0.008/0.0345\approx 0.2319$, i.e., approximately 23.19%. This result is meaningful because even though machine C has the LOWEST individual defect rate (2%), it still contributes a non-trivial share of defective items overall since it produces the largest share of total output (40%) — illustrating how Bayes theorem correctly balances both the prior probability (production share) and the likelihood (defect rate) to give the true posterior probability.



Class 12 Mathematics Chapter 13 – Solutions and Notes

For complete step-by-step answers and a quick summary, check the [Class 12 Mathematics Chapter 13 Solutions](#) and [Class 12 Mathematics Chapter 13 Revision Notes](#).

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