

Probability

1. A and B are two independent events with probabilities $P(A) = 0.3$ and $P(B) = 0.4$. Find the probability of

- i. Occurring A or B or Both A and B.
- ii. $P(C | A')$, where C is the event of not occurring A or B.

2. A sack contains 6 red beads and 4 blue beads. One bead is randomly chosen from the sack and its color is noticed. Another bead is taken from the sack without replacing the first bead. Find the probability of,

- i. Both beads are in the same color.
- ii. Beads taken are in different colors.
- iii. At least one bead is red.
- iv. Second bead is blue.

3. In a driving license test, the probability of passing the test of a randomly selected person in first attempt is $1/3$. Once a person is failed, the probability of failing the test is second attempt is half the probability of failing in the first attempt.

- i. Find the probability of passing the test in 3 or fewer than 3 attempts.
- ii. Given that, a person has passed in fewer than 4 attempts, find the probability of passing from the first attempt.

4. Given that $P(A) = \frac{3}{4}$, $P(B|A) = 1/5$, $P(B'|A') = 4/7$, Find

- i. $P(A \cap B)$
- ii. $P(B)$
- iii. $P(A|B)$

5. Let A, B and C be three independent events of a sample space Ω . Show that A and $(B \cup C)$ are independent events.

6. Let A and B are independent such as $P(A' \cap B) = 2/15$ and $P(A \cap B') = 1/6$. Prove that $P(B)$ has two values.

7. If R is an event related with A and B events such as $P(A) = 0.4$, $P(B) = 0.6$, $P(R|A) = 0.6$ and $P(R|B) = 0.3$, Find $P(B|R')$.

8. In a certain country, among all births, approximately 1 in 90 is a twin birth. All other births are single births. (Ignore the births with more than two babies). Approximately 55 percent of the single births are girls. Approximately one third ($1/3$) of all twins are identical (one-egg) and two-third ($2/3$) are fraternal (two-egg) twins. Identical twins are necessarily the same sex, with male and female being equally likely. Among fraternal twins, approximately one-fourth ($1/4$) are both female, one-fourth are both male and half ($1/2$) are one male and one female. Calculate the following probabilities.

- a) A birth results in identical twin boys
- b) A birth results in twin girls
- c) A birth results in at least one girl