

Probability — Assignment 2

Class 11 Maths · Higher-difficulty challenge set + integrated problems · Answer key included · Narayan Gurukul Academy

Instructions: (1) Attempt all questions; start with the topic-wise challenge set, then attempt the integrated (multi-topic) problems.
 (2) Give all answers with correct SI units. $g = 10 \text{ m/s}^2$ unless stated.
 (3) A final answer key is provided at the end — try the full set before checking it.

Part A — Topic-wise challenge questions

Random Experiments and Outcomes

1. Write the sample space when a coin is tossed twice.
2. Write the sample space when a die is rolled once.
3. Write the sample space for the experiment of tossing a coin three times and count the number of outcomes.

Sample Space and Events

1. An event A is 'getting a prime number' when a die is rolled. List the outcomes of A.
2. Write the sample space for tossing a coin and rolling a die together.
3. Two coins are tossed. List all events and find the event of getting exactly one head.

Types of Events

1. Give an example of a sure event when a die is rolled.
2. Give an example of an impossible event when a die is rolled.
3. Classify as sure, impossible or compound: getting a number less than 7; getting 8; getting an even number, when a die is rolled.

Axioms of Probability

1. If $P(A) = 0.4$, find $P(A')$.
2. If A and B are mutually exclusive with $P(A) = 0.3$ and $P(B) = 0.4$, find $P(A \cup B)$.
3. If $P(A) = 0.5$, $P(B) = 0.4$ and $P(A \cap B) = 0.2$, find $P(A \cup B)$.

Complementary Events and the Addition Theorem

1. If $P(A) = 0.35$, find $P(\text{not } A)$.
2. If $P(A \cup B) = 0.7$, $P(A) = 0.4$ and $P(B) = 0.5$, find $P(A \cap B)$.
3. If $P(A) = 0.5$, $P(B) = 0.6$ and $P(A \cap B) = 0.3$, find $P(A \cup B)$ and $P(A' \cap B')$.

Mutually Exclusive Events

1. When a die is rolled, are 'getting an even number' and 'getting an odd number' mutually exclusive?
2. If $P(A) = 0.3$ and $P(B) = 0.5$ with A, B mutually exclusive, find $P(A \cup B)$.
3. When a die is rolled, find the probability of getting an even number or a number greater than 4.

Odds in Favour and Against

1. If $P(A) = 1/4$, find the odds against A.
2. The odds in favour of an event are 2 : 3. Find the probability of the event.
3. The odds against an event are 5 : 2. Find the probability of its occurrence.

Part B — Integrated problems (multi-topic)

1. Write the sample space when a coin is tossed twice.
2. If $P(A) = 0.4$, find $P(A')$.
3. If $P(A) = 0.35$, find $P(\text{not } A)$.
4. If $P(A) = 0.3$ and $P(B) = 0.5$ with A, B mutually exclusive, find $P(A \cap B)$.
5. If $P(A) = 3/5$, find the odds in favour of A.

Answer Key

Random Experiments and Outcomes

HH, HT, TH, TT. {1, 2, 3, 4, 5, 6}. Three coins: 8 outcomes.

Sample Space and Events

$A = \{2, 3, 5\}$. $S = \{H_1, H_2, H_3, H_4, H_5, H_6, T_1, T_2, T_3, T_4, T_5, T_6\}$. Exactly one head = {HT, TH}.

Types of Events

Sure: number less than 7. Impossible: getting 8. Compound: getting an even number.

Axioms of Probability

0.6. 0.7. 0.7.

Complementary Events and the Addition Theorem

0.65. 0.2. $P(A \cap B) = 0.8$; $P(A' \cap B') = 0.2$.

Mutually Exclusive Events

Yes. 0.8. Even or $> 4 = \{2, 4, 6\} \cap \{5, 6\} = \{2, 4, 5, 6\}$, $P = 4/6 = 2/3$.

Odds in Favour and Against

Odds against = 3 : 1. Odds 2 : 3 $\Rightarrow P = 2/5$. Odds against 5 : 2 $\Rightarrow P = 2/7$.

Integrated problems

1: HH, HT, TH, TT. 2: 0.6. 3: 0.65. 4: 0.8. 5: 3 : 2.