

PRACTICE PROBABILITY

- 1) Urn A contain 1 white, 2 black, 3 red balls. Urn B contain 2 white, 1 black, 1 red balls. Urn C contains 4 white, 5 black, 3 red balls. Two balls are drawn from one of the Urn and found to be one white and one red. Find the probabilities that they come from Urns A, B or C. 16/39
- 2) A die is thrown 120 times and getting 1 or 5 is considered success. Find the mean, variance of number of successes. $\mu = 40, \sigma^2 = 26.7$
- 3) Given $P(A) = 0.3, P(B) = 0.2$, Find $P(B/A)$ if A and B are mutually exclusive events. (0)
- 4) The parameters n and p are 12 and $\frac{1}{3}$ for a binomial distribution. Find standard deviation. (1.63)
- 5) A man fires 4 bullets on a thief. The probability that the thief will be killed by one bullet is 0.6. Find the probability that the thief is still alive. (0.4)⁴
- 6) In a hurdle race a player has to cross 10 hurdles. The probability that will clear each hurdle is $\frac{5}{6}$, what is the probability that he will knock down fewer than 2 hurdles. (0.4845)
- 7) If on an average 1 ship in every 10 sinks, find the chance that out of 5 ships atleast 4 will arrive safely. (0.9185)
- 8) 4 persons are chosen at random from a group of 3 men, 2 women, 3 children. Find the probability that out of 4 choice, exactly 2 are children. $\frac{3}{7}$
- 9) Suppose X has a binomial distribution $B(6, \frac{1}{2})$ show that $X = 3$ is the most likely outcome.
- 10) In a binomial distribution, the sum of mean and variance is 42. Product is 360. Find the distribution. $(\frac{2}{5} + \frac{3}{5})^{50}$
- 11) Given that the two numbers appearing on two dice are different. Find the probability of the event 'the sum of numbers on the dice is 4'. $\frac{1}{15}$
- 12) $P(A) = \frac{1}{2}, P(B) = \frac{7}{12}$ $P(\text{not A or not B}) = \frac{1}{4}$ state whether A and B are independent. (No)
- 13) Three cards are drawn with replacement from a well shuffled pack of cards. Find the probability that cards are a king, queen and a jack. $\frac{6}{2197}$
- 14) Find the probability of throwing almost 2 sixes in 6 throws of a single dice. $(\frac{35}{18})(\frac{5}{6})^4$
- 15) Find the probability that sum of the numbers showing on the two dice is 8, given that atleast one dice doesn't show five. $(\frac{3}{25})$
- 16) The mean and variance of a binomial distribution are 4 and $\frac{4}{3}$. Find $P(X \geq 1)$ $(\frac{728}{729})$
- 17) 6 boys and 6 girls sit in a row at random. Find the probability that 1) The six girls sit together
2) The boys and girls sit alternatively. $(\frac{1}{132})(\frac{1}{462})$
- 18) If A, B, C are events associated with random expt. Prove that
 $P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(A \cap C) - P(B \cap C) + P(A \cap B \cap C)$

- 19) Shreya visits the cities A, B, C and D at random. What is the probability that he visits
1) A before B 2) A just before B. $\left(\frac{1}{2}, \frac{5}{24}\right)$
- 20) What are the odds in favour of getting a '3' in a throw of die? What are the odds against getting 3? $\left(\frac{1}{5}, \frac{5}{1}\right)$
- 21) A pack of 52 cards were distributed equally among 4 players. Find the chance that 4 kings are held by particular player. $\left(\frac{11}{4165}\right)$
- 22) A fair die is rolled. The probability that the first 1 occurs at the even number of trails is $\left(\frac{5}{11}\right)$
- 23) If a 4 digit number > 5000 are randomly formed from digits 0,1,3,5,7. Find probability of forming a number divisible by 5 when (1) digits are repeated 2) digits are not repeated. $\left(\frac{2}{5}, \frac{3}{8}\right)$
- 24) A letter is chosen at random from the word "ASSASSINATION". Find the probability that the letter is a vowel. $\left(\frac{6}{13}\right)$
- 25) A fair die is rolled. The probability that the first 1 occurs at even number of trails is $\left(\frac{5}{11}\right)$
- 26) If three distinct numbers are chosen at randomly from first 100 natural nos. then the probability that all of them are divisible by 2 or 3 is $\left(\frac{4}{1155}\right)$
- 27) A coin is tossed 7 times. Find the probability distribution of getting 'r' heads. $\left(7C_r \left(\frac{1}{2}\right)^7, r = 0, 1, 2, \dots, 7\right)$
- 28) A company produces 10% defective items. Find the probability of getting 2 defective items in a sample of 8 items is $\frac{28 \times 9^6}{10^8}$
- 29) Obtain the probability distribution of number of sixes in two tosses of a dice. Also find mean/ variance. $\left(\frac{25}{36}, \frac{10}{36}, \frac{1}{36}, \frac{1}{3}, \frac{5}{18}\right)$
- 30) A,B,C tosses a coin in turns. The first one to throw a 'head' wins game. What are their respective chances of winning. $\left(\frac{4}{7}, \frac{2}{7}, \frac{1}{7}\right)$
- 31) A man is known to speak truth 3 times out of 4. He throws a dice and reports that it is a six. Find the probability that it is actually a six. $\left(\frac{3}{4}\right)$
- 32) Suppose that a fair dice are tossed and let X represents "The sum of points". Find the mean/ variance of X. $\left(7, \sqrt{2.41}\right)$
- 33) Find the probability that sum of nos. appearing and showing on two dice is 8, given that atleast one of the dice doesn't show 5. $\left(\frac{1}{9}\right)$
- 34) A tells lie is 30% cases, and B in 35% cases find the probability that both state same fact.

- 35) Two cards are drawn without replacement from a pack. Find the probability distribution of number of face cards.

$$\left[\frac{105}{221}, \frac{96}{221}, \frac{20}{221} \right]$$

$$P(X) = \begin{matrix} 0 & 1 & 2 \end{matrix}$$

- 36) A man takes a step forward with probability 0.4 and backwards with a probability 0.6. Find the probability that after 11 steps he is just one step away from the starting point.

$$(462) \times (0.24)^5$$

- 37) Find the probability distribution of the sum of the numbers obtained when two dice are thrown once. (All 11 prob. distributions to be shown)

- 38) Two cards are drawn from a pack. Find the probability that number of aces are drawn. (Write probability distribution table)

- 39) Find the mean and variance of number of sixes in two tosses of a die. $\left(\frac{1}{3}\right)\left(\frac{5}{18}\right)$

- 40) 6 coins are tossed simultaneously. Find the probability of getting 1) no heads 2) 3 heads

$$\left(\frac{1}{64}\right)\left(\frac{5}{16}\right)$$

- 41) If $2P(A) = P(B) = \frac{5}{13}$ and $P\left(\frac{A}{B}\right) = \frac{2}{5}$ Find $P(A \cap B)$

- 42) If E and F are events such that $P(F) = \frac{1}{4}$, $P(F) = \frac{1}{2}$ and $P(E \cap F) = \frac{1}{8}$ find $P(\bar{E} \cap \bar{F})$

- 43) $P(\text{A speaks truth}) = \frac{4}{5}$. A coin is tossed. 'A' reports that a head appears. The probability that actually there was a head is.

- 44) Two cards are drawn from a pack and kept out. Then one card is drawn from remaining 50 cards. Find the prob. that it is an ace. $\left(\frac{1}{13}\right)$

- 45) Two dice are thrown. Find the probability that the number appeared have a sum 8 if it is known that second dice always exhibits 4. $\left(\frac{1}{6}\right)$

- 46) If the second die always shows an odd no. find the conditional probability of getting a sum as 7, if a pair of dice is to be known. $\left(\frac{1}{6}\right)$

- 47) $P(A) = \frac{1}{2}$, $P(B) = \frac{7}{12}$ and $P(\text{not } A \text{ or not } B) = \frac{1}{4}$. State whether A and B independent or not. (NO)

- 48) A die is thrown again and again until three sixes are obtained. Find the probability of obtaining third six in sixth throw of dice. $\left(\frac{625}{23328}\right)$

- 49) Six dice are thrown 729 times. How many times do you expect atleast three dice to show 5 or 6. (233)

- 50) A random variable X has probability distribution P(X) of the following form where K is some number.

$$P(X) = \begin{cases} k & \text{if } x = 0 \\ 2k & \text{if } x = 1 \\ 3k & \text{if } x = 2 \\ 0 & \text{otherwise} \end{cases} \quad \left(\frac{1}{6}\right)\left(\frac{1}{2}\right)$$

Find (1) K (2) P (X > 2)

RAPID FIRE ON PROBABILITY

Q. 1. An unbiased die is rolled. If the random variable X is defined as

$$X(w) = \begin{cases} 1, & \text{if the outcome is an even number} \\ 0, & \text{if the outcome is an odd number} \end{cases}$$

Find probability distribution of X.

Q. 2. A couple has two children. Find the probability that both children are male, if it is known that one of the children is male.

$$P(A) = \frac{1}{2}, P(B) = \frac{7}{12} \text{ and } P(\text{not } A \text{ or not } B) = \frac{1}{4}. \text{ State}$$

Q. 3. Events A and B are such that whether A and B are independent.

Q. 4. In a probability distribution mean is 10 and standard deviation is $2\sqrt{2}$. Find the probability of happening of an event.

Q. 5. “Two cards are drawn successively with replacement from a well shuffled pack of 52 cards”. Find the probability distribution of number of queens. In the above statement

- i. What is the random variable?
- ii. What values a random variable can take?

Q. 6. A random variable X has following probability distribution :

X	0	1	2	3
P(X)	0.3	k	0.1	2k

Find k.

Q. 7. A and B are two events such that $P(A) = 0.3, P(B) = 0.2$ and $P(A \cap B) = 0.05$. Can you conclude events A and B are independent? Give reason.

Q. 8. In a throw of die the number obtained is an odd number. Find the probability of getting a number less than 6.

Q. 9. In a probability distribution mean is 3 and standard deviation is $\sqrt{2}$. Find the probability of non-happening of an event.

Q. 10. For the binomial distribution mean is 4 and variance 6. Is the statement true? Give reason.

Q. 11. A coin is tossed once. Find the probability distribution of number of heads obtained.

Q. 12. A pair of dice is thrown. If the sum is seven. Find the probability that one of the dice shows three.

Q. 13. A die is thrown, if the outcome is an odd number. What is the probability that it is a prime?

Q. 14.

If $P(A) = 0.3$, $P(\bar{B}) = 0.7$ and $P(A \cup B) = 0.5$. Find $P(B | A)$.

Q. 15.

$P(\bar{A}) = 0.4$, $P(B) = 0.2$ and $P(B | A) = 0.5$. Find $P(A \cap B)$.

Q. 16. Probability of a success in an experiment of 4 trials is $\frac{1}{3}$. Find the probability of no success.

Q. 17. The mean and variance of a binomial distribution are 4 and $\frac{4}{3}$ respectively. Find $P(x \geq 1)$.

Q. 18. A die is tossed thrice. Find the probability of getting an odd number at least once.

Answers

1.

X	0	1
P(X)	$\frac{1}{2}$	$\frac{1}{2}$

2. $\frac{1}{3}$

3. Not independent

4. $\frac{1}{5}$

5. i. No. of queens
ii. 0, 1, 2

6. $k = 0.2$

7. No, $P(A \cap B) \neq P(A) P(B)$

8. 1

9. $\frac{2}{3}$

10. False as Mean > Variance

11.

X	0	1
P(X)	$\frac{1}{2}$	$\frac{1}{2}$

12. $\frac{1}{3}$

13. $\frac{2}{3}$

14. $\frac{1}{3}$

15. 0.3

16. $\left(\frac{2}{3}\right)^4$

17. $\frac{728}{729}$

18. $\frac{7}{8}$