



MATHS

BOOKS - FULL MARKS MATHS (TAMIL ENGLISH)

INTRODUCTION TO PROBABILITY THEORY

Example

1. If an experiment has exactly the three possible mutually exclusive outcomes A, B, and check in each case whether the assignment of probability is permissible.

$$(i) P(A) = \frac{4}{7} \quad P(B) = \frac{1}{7}, \quad P(C) = \frac{2}{7}$$

$$(ii) P(A) = \frac{2}{5} \quad P(B) = \frac{1}{5}, \quad P(C) = \frac{3}{7}$$

$$(iii) P(A) = 0.3 \quad P(B) = 0.9 \quad P(C) = -0.2$$

$$(iv) P(A) = \frac{4}{\sqrt{3}} \quad P(B) = 1 - \frac{1}{\sqrt{3}}, \quad P(C) = 0.042$$



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2. An integer is chosen at random from the first ten positive integers. Find the probability that it is a multiple of three?

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3. Three fair coins are tossed together. Find the probability of getting (i) all heads (ii) at least one tail (iii) at most one head (iv) at most two tails

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4. Suppose ten coins are tossed. Find the probability to get (i) exactly two heads (ii) at most two heads (iii) at least two heads

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5. Suppose a fair die is rolled. Find the probability of getting
(1) an even number

(2) multiple of three



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6. When a pair of fair dice is rolled, what are the probabilities of getting the sum

(i) 7

(ii) 7 or 9

(iii) 7 or 12?



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7. Three candidates X, Y, and Z are going to play in a chess competition to win FIDE (World Chess Federation) cup this year. X is thrice as likely to win as Y and Y is twice as likely as to win Z. Find the respective probability of

X, Y and Z to win the cup

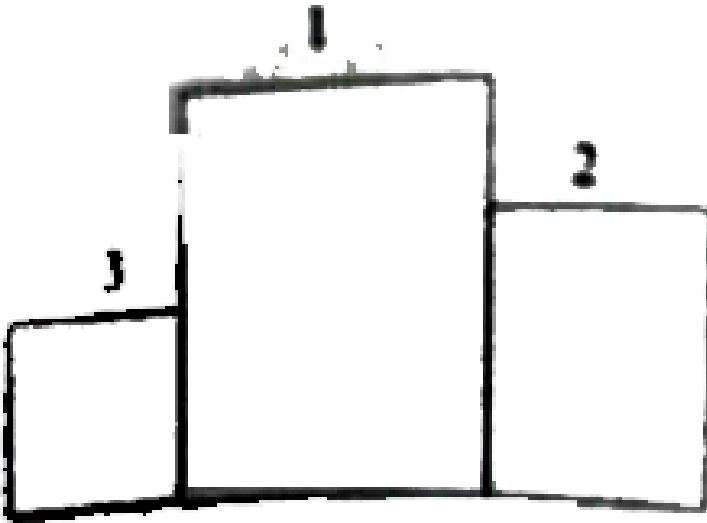


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8. Let the matrix $M = \begin{bmatrix} x & y \\ z & 1 \end{bmatrix}$ If x, y and z are chosen at random from the set $\{1, 2, 3\}$, and repetition is allowed (i.e., $x=y=z$), what is the probability that the given matrix M is a singular matrix?

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9. For a sports meets, a winner's stand comprising of three wooden blocks is in the form as shown in figure. There are six different colours available to choose from and three of the wooden blocks is to be painted such that no two of them has the same colour. Find the probability that the smallest block is to be painted in red, where red is one of the six colours.



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10. A man has 2 ten rupee notes, 4 hundred rupee notes and 6 five hundred rupee in his pocket. If 2 notes are taken at random, what are the

odds in favour of both notes being of hundred rupee denomination and also its probability?

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11. Find the probability of getting the number 7, when a usual dice is rolled.

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12. Nine coins are tossed once, find the probability to get at least two heads.

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13. Given that $P(A) = 0.52$, $P(B) = 0.43$ and $P(A \cap B) = 0.24$ find

(i) $P(A \cap \bar{B})$ $P(A \cup B)$ (iii) $P(\bar{A} \cap \bar{B})$ (iv) $P(\bar{A} \cup \bar{b})$

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14. The probability that a preparation for competitive examination will get a State Government service is 0.12. the probability that she will get Central Government job is 0.25, and the probability that she will get both is 0.07 Find the probability that she will get atleast one of the two jobs (1) she will get only one of the two jobs.

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15. If $P(A) = 0.6$, $P(B) = 0.5$, and $P(A \cap B) = 0.2$

Find (i) $P(A/B)$ (ii) $P(\bar{A}/B)$ (iii) $P(A/\bar{B})$

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16. A die is rolled. If it shows an odd number, then find the probability of getting 5.

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17. Two cards are drawn from a pack of 52 cards in succession. Find the probability that both are Jack when the first drawn card is (i) replaced (i) not replaced.



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18. A coin is tossed twice .Events E and F are defined as follows

E=Head on the first toss

F=Head on the second toss

Find (i) $P(E \cap F)$ (ii) $P\left(\frac{\bar{E}}{F}\right)$

(iii)Are the events E and F independent?



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19. An anti-aircraft gun can take a maximum of four shots at an enemy plane moving away from it. The probability of hitting the plane in the first second third, and fourth shot are respectively 0.2, 0.4 0.2 and 0.1. Find the

probability that the gun hits the plane.



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20. A factory has two machines and Machine I produces 40% of items of the output and Machine II produces 60% of the items. Further 4% of items produced by Machine I are defective and 5% produced by Machine II are defective. An item is drawn at random. If the drawn item is defective, find the probability that it was produced by Machine II. (See the previous example, compare the questions)

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21. A factory has two machines and Machine I produces 40% of items of the output and Machine II produces 60% of the items. Further 4% of items produced by Machine I are defective and 5% produced by Machine II are defective. An item is drawn at random. If the drawn item is defective, find the probability that it was produced by Machine II. (See the previous example, compare the questions)

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22. A construction company employs 2 executive engineers, Engineer 1 does the work for 60% of jobs of the company. Engineer 2 does the work for 40% of jobs of the company. It is known from the past experience that the probability of an error when engineer 1 does the work is 0.03, whereas the probability of an error in the work of engineer 2 is 0.04. Suppose a serious error occurs in the work, which engineer would you guess did the work?

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23. The chances of X, Y and Z becoming managers of a certain company are 4 : 2 : 3. The probabilities that bonus scheme will be introduced if X, Y and Z become managers are 0.3, 0.5 and 0.4 respectively. If the bonus scheme has been introduced, what is the probability that Z was appointed as the manager?



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Exercise 12 1

1. An experiment has the four possible mutually exclusive and exhaustive outcomes A,B,C and D. Check whether the following assignments of probability are permissible.(i)

$$P(A) = 0.15, P(B) = 0.30, P(C) = 0.43, P(D) = 0.12$$

$$(ii) P(A) = 0.22, P(B) = 0.38, P(C) = 0.16, P(D) = 0.34$$

$$(iii) P(A) = \frac{2}{5}, P(B) = \frac{3}{5}, P(C) = -\frac{1}{5}, P(D) = \frac{1}{5}$$



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2. If two coins are tossed simultaneously, then find the probability of getting

(i) one head and one tail

(ii) at most two tails



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3. Five mangoes and 4 apples are in a box. If two fruits are chosen at random, find the probability that

(i) one is a mango and the other is an apple

(ii) both are of the same variety.



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4. What is the chance that (i) non-leap year (ii) leap year should have fifty three sundays?



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5. Eight coins are tossed once, find the probability of getting

(i) exactly two tails

(ii) at least two tails

(iii) at most two tails



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6. An integer is chosen at random from the first 100 positive integers.

What is the probability that the integer chosen is a prime or multiple of

8?



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7. A bag contains 7 red and 4 black balls, 3 balls drawn at random. Find

the probability that

(i) all are red

(ii) one red and 2 black.



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8. A single card is drawn from a pack of 52 cards. What is the probability that (i)the card is an ace or a king ,(ii)the card will be 6 or smaller, (iii)the card is either a queen or 9?

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9. A cricket club has 16 members, of whom only 5 can bowl . What is the probability that in a team of 11 members at least 3 bowlers are selected?

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10. (i) If the odds that the event A occurs is 5 to 7 find $P(A)$.

(ii) Suppose $P(B) = \frac{2}{5}$. Express the odds that the event B occurs.

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Exercise 12 2

1. If A and B are two events associated with a random experiment for which $P(A) = 0.35$, $P(A \text{ or } B) = 0.85$, and $P(A \text{ and } B) = 0.15$. Find

(i) $P(\text{only } B)$ (ii) $P(\overline{B})$ (iii) $P(\text{only } A)$



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2. A dice is thrown twice. Let A and be the event ,First dice shows 5 and B be the event, second dice shown 3 Find $P(A \cup B)$.



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3. The probability of an event A occurring is 0.5 and B occurring is 0.3. If A and B are mutually exclusive events, then find the probability of

(i) $P(A \cup B)$ (ii) $P(A \cap \overline{B})$ (iii) $P(\overline{A} \cap B)$.



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4. The probability that a new railway bridge will get an award for its design is 0.48, the probability that it will get an award for the efficient use of materials is 0.36, and that it will get both awards is 0.2. What is the probability, that

(i) it will get at least one of the awards

(ii) it will get only one of the awards.



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Exercise 12 5

1. If X and Y be two events such that

$P(X/Y) = \frac{1}{2}$, $P(Y/X) = \frac{1}{3}$ and $P(X \cap Y) = \frac{1}{6}$ then $P(X \cup Y)$ is

.....

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

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

C. $\frac{2}{5}$

D. $\frac{1}{6}$

Answer: B::C



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2. If two events A and B are independent such that $P(A) = 0.35$ and $P(A \cup B) = 0.6$, then P(B) is

A. $\frac{5}{13}$

B. $\frac{1}{13}$

C. $\frac{4}{13}$

D. $\frac{7}{13}$

Answer:



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3. If two events A and B are such that $P(\bar{A}) = \frac{3}{10}$ and $P(A \cap \bar{B}) = \frac{1}{2}$, then $P(A \cap B)$ is

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

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

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

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

Answer:



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4. If A and B are two events such that $P(A) = 0.4$, $P(B) = 0.8$ and $P(B/A) = 0.6$, then $P(\bar{A} \cap B)$ is

A. 0.96

B. 0.24

C. 0.56

D. 0.66

Answer:

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5. It is given that the events A and B are such that

$P(A) = \frac{1}{4}$, $P(A/B) = \frac{1}{2}$ and $P(B/A) = \frac{2}{3}$. Then P(B) is

A. $\frac{1}{6}$

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

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

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

Answer:

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6. In a certain college 4% of the boys and 1% of the girls are taller than 1.8 meter. Further 60% of the students are girls. If a student is selected at random and is taller than 1.8 meters, then the probability that the students is a girls is

A. $\frac{2}{11}$

B. $\frac{3}{11}$

C. $\frac{5}{11}$

D. $\frac{7}{11}$

Answer:



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7. Ten coins are tossed. The probability of getting at least 8 heads is

A. $\frac{7}{64}$

B. $\frac{7}{32}$

C. $\frac{7}{32}$

D. $\frac{7}{128}$

Answer:



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8. The probability of two events A and B are 0.3 and 0.6 respectively. The probability that both A and B occur simultaneously is 0.18. The probability that neither A nor B occurs is

A. 0.1

B. 0.72

C. 0.42

D. 0.28

Answer:



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Additional Problem

1. An experiment has the four possible mutually exclusive outcomes A, B, C and D. whether the following assignments of probability are permissible.

$$P(A) = 0.32P(B) = 0.28P(C) = -0.6. P(D) = 0.46$$

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2. Three coins are tossed together. Find the probability of getting exactly two heads.

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3. A bag contains 5 white and 7 black balls,3 balls are drawn at random.Find the probability that (i)all are white,(ii)one white and two black.

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4. In a box containing 10 bulbs, 2 are defective. What is the probability that among 5 bulbs chosen at random, none is defective?

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5. Out of 10 outstanding students in a school there are 6 girls and 4 boys. A team of 4 students is selected at random for a quiz programme, find the probability that there are at least 2 girls.

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6. An integer is chosen at random from the first fifty positive integers. What is the probability that the integer chosen is a prime or multiple of 4?

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7. A and B are two events associated with random experiment for which $P(A) = 0.36$, $P(A \cup B) = 0.90$ and $P(A \cap B) = 0.25$. Find (i) $P(B)$, (ii) $P(\bar{A} \cap \bar{B})$



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8. Given $P(A) = 0.5$, $P(B) = 0.6$ and $P(A \cap B) = 0.24$. Find (i) $P(A \cup B)$, (ii) $P(\bar{A} \cap B)$, (iii) $P(A \cap \bar{B})$, (iv) $P(\bar{A} \cup \bar{B})$, (v) $P(\bar{A} \cap \bar{B})$



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9. The probability of an event A occur is 0.6 and B occurring is 0.3. If A and B are mutually exclusive events then the probability of neither A nor B occurring is :



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10. The probability that a new ship will get an award for its design is 0.25, the probability that it will get an award for the efficient use of materials is 0.35 and that it will get both awards is 0.15. What is the probability that (i) it will get atleast one of the two awards (ii) it will get only one of the awards?



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11. If $P(A) = 0.4$, $P(B) = 0.7$ and $P(B/A) = 0.5$ find $P(A/B)$ and $P(A \cup B)$



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12. $P(A) = 0.3$, $P(B) = 0.6$ and $P(A \cap B) = 0.25$. Find (i) $P(A \cup B)$, (ii) $P(A/B)$, (iii) $P(B/\bar{A})$, (iv) $P(\bar{A}/B)$, (v) $P(\bar{A}/\bar{B})$



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13. Two cards are drawn by one at random from of 52 playing cards. What is the probability of getting two jacks if (i) the first card is replaced before the second card is drawn (ii) the first card is not replaced before the second is drawn ?

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14. A husband and wife appear in an interview of vacancies in the same post. The probability of husband's election is $\frac{1}{6}$ and that of wife's selection is $\frac{1}{5}$. What is the probability that (i) both of them will be selected, (ii) only one of them will be selected, (iii) none of them will be selected ?

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15. A factory has two Machines-I and II. Machine-I produces 25% of items and Machine-II produces 75% of the items of the total output. Further 3% of the items produced by Machine-I are defective whereas 4% produced

by Machine - II are defective. If an item is drawn at random what is the probability that it is defective?

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16. There are two identical boxes containing respectively 5 white and 3 red balls, 4 white and 6 red balls. A box is chosen at random and a ball is drawn from it (i) find the probability that the ball is white (ii) if the ball is white, what is the probability that it from the first box?

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17. In a factory Machine-I produces 45% of the output and Machine -II 55% of the output. On the average 10% items produced by I and 5% of the items produced by II are defective. An item is drawn at random from a day's output. (i) find the probability that it is a defective item (ii) if it is defective, what is the probability that it was produced by Machine-II ?

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