MATHS

BOOKS - RS AGGARWAL MATHS (HINGLISH)

PROBABILITY

Solved Examples

1. A die is rolled. If the outcome is an odd number, what is the probability that it is prime?

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2. Ten cards numbered1 through 10 are placed in a box, mixed up thoroughly and then one card is drawn randomly. If it is known that the

number on the drawn card is more than 3, what is the probability that it is an even number.

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3. A die is thrown twice and the sum of the numbers appearing is observed to be 6. What is the conditional probability that the number 4 has appeared at least once?

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4. Assume that each child born is equally likely to be a boy or a girl. If a family has two children, what is the conditional probability that both are girls given that i. the youngest is a girl, ii. at least one is a girl?

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5. An instructor has a question bank consisting of 300 easy True / False questions. 200 difficult True / False questions. 500 easy multiple choice questions and 400 difficult multiple choice questions. If a question is selected at random from the

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6. Two numbers are selected at random from integers 1 through 9. If the sum is even, find the probability that both the numbers are odd.

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7. If A and B are the two events such that $P(A) = \frac{3}{5}$, $P(B) = \frac{7}{10}$ and $P(A \cup B) = \frac{9}{10}$, then find

(i) $P(A \cap B)$

(ii) $P\left(\frac{A}{B}\right)$

(iii) $P\left(\frac{B}{A}\right)$

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8. Evaulate $P(A \cup B)$, if $2P(A) = P(B) = \frac{6}{13}$ and $P(A/B) = \frac{1}{3}$.

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9. Let a and B be the events such that $P(A) = \frac{1}{3}, P(B) = \frac{1}{4}$ and $P(A \cap B) = \frac{1}{5}$. Find : (i) $P(A/B)$ (ii) $P(B/A)$ (iii) $P(A \cup B)$ (iv) $P(\overline{B}/\overline{A})$

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10. An urn contains 8 white and 4 red balls. Two balls are drawn from the urn one after the other without replacement. What is the probability that both drawn balls are white ?

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11. Three cards are drawn successively without replacement from a pack of 52 well-shuffled cards . What is the probability that first two cards are queens and the third card drawn is a king ?

A. $\frac{2}{5525}$

B. $\frac{4}{5525}$

C. $\frac{6}{5525}$

D. $\frac{8}{5525}$

Answer: A

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12. Let E_1 and E_2 be two events such that $P(E_1) = 0.3, P(E_1 \cup E_2) = 0.4$ and $P(E_2) = x$. Find the value of x such that

(i) E_1 and E_2 are mutually exclusive,

(ii) E_1 and E_2 are independent.

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13. Let E_1 and E_2 are the two independent events such that $P(E_1) = 0.35$ and $P(E_1 \cup E_2) = 0.60$, find $P(E_2)$.

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

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

C. $\frac{6}{13}$

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

Answer: B

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14. A coin is tossed thrice. Let the event E be the first throw results in a head and the event F be the last throw results in a tail. Find whether the events E and F are independent.

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15. An unbiased die is tossed twice. Find the probability of getting a 4, 5 or 6 on the first toss and a 1, 2, 3 or 4 on the second toss.

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

B. $\frac{2}{6}$

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

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

Answer: D

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16. Ramesh appears for an interview for two posts, A and B, for selection is independent. The probability for his selection for Post A1/6) and for Post B, it is (1/7). Find the probability that Ramesh is selected for at least one post.

A. $\frac{1}{7}$

B. $\frac{2}{7}$

C. $\frac{3}{7}$

D. $\frac{4}{7}$

Answer: B

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17. A can solve 90% of the problems given in a book and B can solve 70%. What is the probability that at least one of them will solve the problem, selected at random from the book?

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18. The probability that A hits a target is $(1/3)$ and the probability that B hits it is $(2/5)$. What is the probability that the target will be hit if both A and B shoot at it ?

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19. A and B appear for an interview for two posts. The probability of A's selection is $(1/3)$ and that of $B's$ selection is $(2/5)$. Find the probability that only one of them will be selected.

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20. A speaks truth in 60% of cases, while B in 90% of the cases. In what percent of cases are they likely to contradict each other in stating the same fact?

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21. Probability of solving specific problem independently by A and B are $\frac{1}{2}$ and $\frac{1}{3}$ respectively. If both try to solve the problem independently find the probability that(i) the problem is solved (ii) exactly one of them solves the problem.

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22. Amit and Nisha appear for an interview for two vacancies in a company. The probability of Amit's selection is 1/5 and that of Nisha's selection is $.^{1}/_{6}$. What is the probability that (i) both of them are selected? (ii) only one of them is selected? (iii) none of them is selected?

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23. Three groups of children contain 3 girls and 1 boy; 2 girls and 2 boys; 1 girl and 3 boys respectively. One child is selected at random from each group. Find the chance that the three selected comprise one girkl and 2 boys.

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24. A problem is given to three students whose chances of solving it are 1/3, $.^{2}/_{7}$ and 3/8. What is the probability that the problem will be solved?

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25. A problem in mathematics is given to three students whose chances of solving it correctly are `1/2,1/3 and 1/4' respectively . what is the probability that only one of , them solves it correctly?

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26. Three critics review a book. Odds in favour of the book are 5:2, 4:3 and 3:4 respectively for three critics. Find the probability that eh majority are in favour of the book.

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27. The odds against a husband who is 45 years old, living till he is 70 are 7:5 and the odds against his wife who is now 36, living till she is 61 are 5:3. Find the probability that the couple will be alive 25 years hence, exactly one of them will be alive 25 years hence, none of them will be alive 25 years hence, at least one of them will be alive 25 years hence.

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28. A, B and C shot to hit a target. If A hits the target 4 times in 5 trails, B hit it 3 times in 4 trials and C hits 2 time in 3 trials; what is the

probability that the target is hit by a least 2 person?

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29. Find the mean, variance and standard deviation of the number of tails in two tosses of a coin.

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30. Find the mean, variance and standard deviation of the number heads when three coins are tossed.

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31. A die is tossed once. If the random variable X is defined as

$$X = \begin{cases} 1, \text{if the die results in an even number} \\ 0, \text{if the die results in an odd number} \end{cases}$$

then find the mean and variance of X.

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32. Find the mean, variance, standard deviation of number 6 in the two throws of a dice.

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33. Two cards are drawn successively with replacement from a well-shuffled pack of 52 cards. Find the mean and variance of the number of kings.

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34. Two cards are drawn simultaneously (or successively without replacement) from a well-shuffled pack of 52 cards. Find the mean and variance of the number of aces.

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35. Three defective bulbs are mixd with 7 good ones. Let X be the number of defective bulbs when 3 bulbs are drawn at random. Find the mean and variance of X.

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36. An urn contians 4 white and 3 red balls. Let X be the number of red balls in a random draw of 3 balls. Find the mean and variance of X.

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37. In a game 3 coins are tossed. A person is paid Rs. 5, if he gets all head or all tail and be in supposed pay Rs. 3 if he gets are head or 2 heads. What can be expert to win on an arrange per game.

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38. A coin is tossed 4 times . If x is the number of heads observed , find the probability distribution of X.

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39. Find the probability distribution of the number of sixes in three tosses of a die.

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40. Find the probability distribution of the number of doublets in four throws of a pair of dice.

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41. An unbiased coin is tossed 6 times .Find using binomial distribution , the probability of getting at least 5 heads .

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42. An unbiased coin is tossed 8 times . Find by using binomial distribution the probability of getting at least 3 heads

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43. Six coin are tossed simultaneously . Find the probability of getting

(i) 3 heads (ii) no head (iii) at least one head

(iv) not more than 3 heads .

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44. A die is throws 5 times . If getting an odd number is a success , find the probability of getting at least 4 successes.

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45. In 4 throws with a pair of dice , what is the probability of throwing doublets at least twice ?

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46. The bulbs produced in a factory are supposed to contain 5% defective bulbs . What is the probability that a sample of 10 bulbs will contain not more than 2 defective bulbs?

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47. If one out of 10 coming ships is wrecked. Find the probability that out of five coming ships at least 4 reach safely.

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48. If X follows a binomial distribution with mean 3 and variance $(3/2)$ find

$(i)P(X \geq 1)(ii)P(X \leq 5)$

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49. If X follow a binomial distribution with mean 4 and variance 2 find

$P(X \geq 5)$

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50. find the binomial distribution for which the mean and variance are 12 and 3 respectively .

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51. If the sum of the mean and variance of a binomial distribution for 5 trials is 1.8; find the distribution.

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52. The sum and the product of the mean and variance of a binomial distribution are 24 and 128 respectively . Find the distribution.

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53. In a binomial distribution , prove that mean $>$ variance

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54. A die is tossed thrice. Getting an even number is considered a success

What is the variance of the binomial distribution ?

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55. A die is rolled 20 times . Getting a number greater than 4 is a success.

Find the mean and variance of the number of successes .

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56. A die is tossed 180 times. Find the expected number (μ) of times the face

with the number 5 will appear. Also find the standard deviation (σ) and variance (σ^2)

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Exercise 29 A

1. If $P(A)\frac{7}{13}, P(B) = \frac{9}{13}$ and $P(A \cap B) = \frac{4}{13}$, find $P\left(\frac{A}{B}\right)$.

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2. Let A and B be the events such that

$P(A) = \frac{5}{11}, P(B) = \frac{6}{11}$ and $P(A \cup B) = \frac{7}{11}$.

Find (i) $P(A \cap B)$ (ii) $P(A/B)$ (iii) $P(B/A)$ (iv) $P\left(\overline{A}/\overline{B}\right)$.

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3. Let a and B be the events such that

$P(A) = \frac{3}{10}, P(B) = \frac{1}{2}$ and $P(B/A) = \frac{2}{5}$.

Find (i) $P(A \cap B)$ (ii) $P(A \cup B)$ (iii) $P(A/B)$.

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4. If A and B are two events such that $2P(A) = P(B) = \frac{5}{13}$ and $P\left(\frac{A}{B}\right) = \frac{2}{5}$, find $P(A \cup B)$.

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5. A die is rolled. If the outcome is an even number, what is the probability that it is a number greater than 2?

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6. A coin is tossed twice. If the outcome is at most one tail, what is the probability that head and tail have appeared.

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7. Three coins are tossed simultaneously. Find the probability that all coins show heads if at least one of the coins shows a head.

A. $\frac{2}{7}$

B. $\frac{1}{7}$

C. $\frac{3}{7}$

D. $\frac{4}{7}$

Answer: B

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8. Two unbiased dice are thrown. Find the probability that the sum of the numbers appearing is 8 or greater, if 4 appears on the first die.

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9. A die is thrown twice and the sum of the numbers appearing is observed to be 8. What is the conditional probability that the number 5 has appeared at least once?

A. $\frac{5}{36}$

B. $\frac{2}{36}$

C. $\frac{3}{10}$

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

Answer: D

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10. Two dice were thrown and it is known that the numbers which come up were different. Find the probability that the sum of the two numbers was 5.

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11. A coin is tossed and then a die is thrown. Find the probability of obtaining a 6, given that a head came up.

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12. A couple has 2 children. find the probability that the both are boys if it is given that (i) one of the child is boy (ii) the older child is boy.

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13. In a class, 40% students study mathematics, 25% study biology and 15 % study both mathematics and biology. One student is selected at random. Find the probability that

(i) he studies mathematics if it is known that he studies biology

(ii) he studies biology if it is known that he studies mathematics.

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14. The probability that a student selected at random from a class will pass in Hindi is $\frac{4}{5}$ and the probability that he passes in Hindi and

English is $\frac{1}{2}$. What is the probability that he will pass in English if it is known that he has passed in Hindi ?

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15. The probability that a certain person will buy a shirt is 0.2, the probability that he will buy a trouser is 0.3, and the probability that he will buy a shirt given that he buys a trouser is 0.4. Find the probability that he will buy both a shirt and a trouser. Find also the probability that he will but a trouser given that he buys a shirt.

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16. In a hostel 60% of the students read Hindi news paper, 40% read English news paper and 20% read both Hindi and English news papers. A student is selected at random. (a) Find the probability that she reads neither Hindi nor English news papers. (b

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17. Two integers are selected at random from integers 1 through 11. If the sum is even, find the probability that both the numbers are odd.

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Exercise 29 B

1. A bag contains 17 tickets, numbered from 1 to 17. A ticket is drawn and another ticket is drawn without replacing the first one. Find the probability that both the ticket may show even numbers.

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2. Two marbles are drawn successively from a box containing 3 black and 4 white marbles. Find the probability that both the marbles are black, if the first marble is not replaced before the second draw.

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3. A card is drawn from a well-shuffled deck of 52 cards and without replacing this card, a second card is drawn. Find the probability that the first card is a club and the second card is a spade.

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4. There is a box containing 30 bulbs of which 5 are defective. If two bulbs are chosen at random from the box in succession without replacing the first, what is the probability that both the bulbs chosen are defective?

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5. A bag contains 10 white and 15 black balls. Two balls are drawn in succession without replacement. What is the probability that first is

white and second is black?

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6. An urn contains 5 white and 8 black balls. two successive drawing of 3 balls at a time are made such that balls drawn in first draw are not replaced before the second draw. Find the probability that the first draw gives 3 white balls and second draw gives 3 black balls.

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7. Let E_1 and E_2 be the events such that $P(E_1) = \frac{1}{3}$ and $P(E_2) = \frac{3}{5}$.

Find :

(i) $P(E_1 \cup E_2)$, where E_1 and E_2 are mutually ecclusive,

(ii) $P(E_1 \cap E_2)$, when E_1 and E_2 are independent.

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8. If E_1 and E_2 are the two events such that $P(E_1) = \frac{1}{4}, P(E_2) = \frac{1}{3}$ and $P(E_1 \cup E_2) = \frac{1}{2}$, show that E_1 and E_2 are independent events.

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9. If E_1 and E_2 are independent events such that $P(E_1) = 0.3$ and $P(E_2) = 0.4$, find (i) $P(E_1 \cap E_2)$ (ii) $P(E_1 \cup E_2)$ (iii) $P\left(\overline{E_1} \cap \overline{E_2}\right)$ (iv) $P\left(\overline{E_1} \cap E_2\right)$.

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10. Let A and B be the events such that

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

State whether A and B are

(i) mutually exclusive, (ii) independent.

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11. Kamal and Vimal appeared for an interview for two vacancies. The probability of kamal's selection is 1/3 and that of Vimal's selection is 1/5. Find the probability that only one of them will be selected.

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12. Arun and Ved appeared for an interview for two vacancies. The probability of Arun's selection is 1/4 and that of Ved's rejection is 2/3. Find the probability that at least one of them will be selected.

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13. A and B appear for an interview for two vacancies in the same post. The probability of A's selection is 1/6 and that of B's selection is 1/4. Find the probability that (i) Both of them are selected (ii) only one of them is selected (iii) none is selected (iv) at least one of them is selected.

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14. Given the probability that A can solve a problem is 2/3, and the probability that B can solve the same problem is 3/5, find the probability that (i) at least one of A and B will solve the problem (ii) None of the two will solve the problem.

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15. A problem is given to three students whose chances of solving it are 1/4, 1/5 and 1/6 respectively. Find the probability that the problem is solved.

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16. The probalities of A, B, C solving a problem are $\frac{1}{3}$, $\frac{1}{4}$ and $\frac{1}{6}$ respectively. If all the three try to solve the problem simultaneously, find the probability that exactly one of them will solve it.

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17. A can hit a target 4 times in 5 shots, b can hit 3 times in 4 shots, and C can hit 2 times in 3 shots. Calculate the probability that

(i) A, B and C all hit the target

(ii) B and C hit and A does not hit the target.

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18. Neelam has offered physics, chemistry and mathematics in Class XII. She estimates that her probabilities of receiving a grade A in these courses are 0.2, 0.3 and 0.9 respectively. Find the probabilities that Neelam receives

(i) all A grades (ii) no A grade (iii) exactly 2 A grades.

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19. An article manufactured by a company consists of two parts X and Y. In the process of manufacture of part X, 8 out of 100 parts may be defective. Similarly, 5 out of 100 parts of Y may be defective. Calculate the probability that the assembled product will not be defective.

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20. A town has two fire-extinguishing engines, functioning independently. The probability of availability of each engine when needed is 0.95. What is the probability that (i) neither of them is available when needed ? (ii) an engine is available when needed?

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21. The operates if all of its three components function. The probability that the first component fails during the year is 0.14, the second

component fails is 0.10 and the third component fails is 0.05. What is the probability that the machine will fail during the year?

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22. 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 at the first, second, third and fourth shots are $0.4, 0.3, 0.2$ and 0.1, respectively, What is the probability that the plane is hit when all the four shots are fired? (A) 0.4379 (B) 0.6872 (C) 0.6976 (D) 0.3507

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23. A coin is tossed. If head comes up, die is thrown but if tail comes up, the coin is tossed again. Find the probability of obtaining: two tails (ii) head and number 6 (iii) head and an even number,

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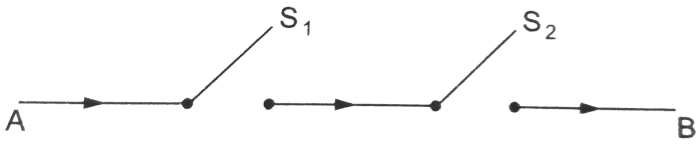
Exercise 29 B

1. Let S_1 and S_2 be the two switches and let their probabilities of working be given by $P(S_1) = 4/5$ and $P(S_2) = .^{9}/_{10}$. Find the probability that the current flows from the terminal a to terminal A to terminal B when S_1 and S_2 are installed in series, shown as follows :



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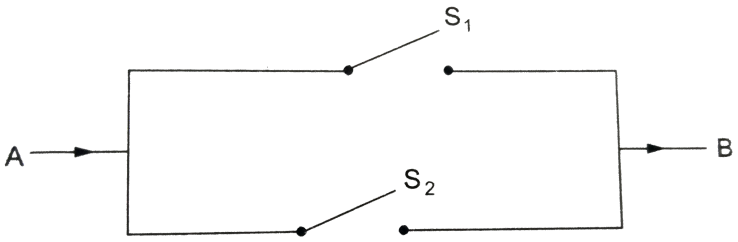
2. Let S_1 and S_2 be two the switches and let their probabilities of working be given by $P(S_1) = 2/3$ and $P(S_2) = .^{3}/_{4}$. Find the probability that the current flow from terminal A to terminal B, when

S_1 and S_2 are installed in parallel, as shown below :



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Exercise 31

1. Find the mean and variance of the number of heads when two coins are tossed simultaneously.

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2. Find the mean and variance of the number of tails when three coins are tossed simultaneously.

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3. A die is tossed twice. 'Getting an odd number on a toss' is considered a success. Find the probability distribution of number of successes. Also, find the mean and variance of the number of successes.

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4. A die is tossed twice. 'Getting a number greater than 4' is considered a success. Find the probability distribution of number of successes. Also, find the mean and variance of the number of successes.

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5. A pair of dice is thrown 4 times. If getting a doublet is considered a success, find the probability distribution of number of successes. Also, find the mean and variance of number of successes.

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6. A coin is tossed 4 times. Let X denote the number of heads. Find the probability distribution of X. Also, find the mean and variance of X.

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7. Let X denote the number of times 'a total of 9' appears in two throws of a pair of dice. Find the probability distribution of X. Also, find the mean, variance and standard deviation of X.

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8. There are 5 cards numbered 1 to 5, one number on one card. Two cards are drawn at random without replacement. Let X denote the sum of the numbers on two cards drawn. Find the mean and variance.

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9. Two cards are drawn successively with replacement from a well-shuffled pack of 52 cards. Find the mean and variance of the number of kings.

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10. A box contains 16 bulbs, out of which 4 bulbs are defective. Three bulbs are drawn at random from the box. Let X be the number of defective bulbs drawn. Find the mean and variance of X.

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11. 20% of the bulbs produced by a machine are defective. Find the probability distribution of the number of defective bulbs in a sample of 4 bulbs chosen at random.

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12. Four bad eggs are mixed with 10 good ones. Three eggs are drawn one by one without replacement. Let X be the number of bad eggs drawn. Find the mean and variance of X.

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13. Four rotten oranges are accidentally mixed with 16 good ones. Three oranges are drawn at random from the mixed lot. Let X be the number of rotten oranges drawn. Find the mean and variance of X.

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14. Three balls are drawn simultaneously from a bag containing 5 white and 4 red balls. Let X be the number of red balls drawn. Find the mean and variance of X.

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15. Two cards are drawn from a well shuffled pack of 52 cards. Find the mean and variance for the number of face cards obtained.

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16. Two cards are drawn successively with replacement from a well shuffled deck of 52 cards. Find the mean and standard deviation of the number of aces.

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17. Three cards are drawn successively with replacement from a well-shuffled deck of 52 cards. A random variable X denotes the number of hearts in the three cards drawn. determine the probability distribution of X.

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18. Five defective bulbs are accidentally mixed with 20 good ones. It is not possible to just look at a bulb and tell whether or not it is defective. Find the probability distribution if four bulbs are drawn from this lot.

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Objective Questions

1. If A and B are mutually exclusive events such that $P(A) = 0.4, P(B) = x$ and $P(A \cup B) = 0.5$ then $x = ?$

A. 0.2

B. 0.1

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

D. none of these

Answer: B

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2. If A and B are independent events such that $P(A) = 0.4, P(B) = x$ and

$P(A \cup B) = 0.5 \text{then} \quad x = ?$

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

B. 0.1

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

D. None of these

Answer: C

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3. If $P(A) = 0,8, P(B) = 0.5$ and $P(B/A) = 0.4$ then $P(A/B) = ?$

A. 0.32

B. 0.64

C. 0.16

D. 0.25

Answer: B

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4. If $P(A) = \frac{6}{11}, P(B) = \frac{5}{11}$ and $P(A \cup B) = \frac{7}{11}$, then $P(A/B) = ?$

A. $\frac{5}{6}$

B. $\frac{5}{7}$

C. $\frac{6}{7}$

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

Answer: D

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5. If A and B are events such that $P(A) = \frac{1}{2}, P(B) = \frac{7}{12}$ and $P(A' \cup B') = \frac{1}{4}$, then A and B are

A. independent

B. mutually exclusive

C. both a and b

D. none of these

Answer: D

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6. If it is given that the probability that A can solve the same problem is $\frac{3}{5}$. The probability that B can solve the same problem is $\frac{2}{3}$. The probability that at least one of A and B can solve a problem is

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

B. $\frac{1}{15}$

C. $\frac{13}{15}$

D. $\frac{2}{15}$

Answer: C

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7. The probabilites of A , B and C of solving a problem are $\frac{1}{6}, \frac{1}{5}$ and $\frac{1}{3}$ respectively , What is the probability that the problem is solved ?

A. $\frac{4}{9}$

B. $\frac{5}{9}$

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

D. none of these

Answer: B

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8. A can hit a target 4 times in 5 shots B can hit 3 times in 4 shots and C can hit 2 times in 3 shots . The probability that B and C hit and A does not hit is

A. $\frac{1}{10}$

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

C. $\frac{7}{10}$

D. none of these

Answer: A

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9. A machine operates only when all of its three components function The probabilities of the failures of the first , second and third component are 0.2, 0,3 and 0.5 respectively . What is the probability that the machine will fail ?

A. 0.70

B. 0.72

C. 0.07

D. none of these

Answer: B

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10. A die is rolled . If the outcome is an odd number what is the probability that it is prime ?

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

B. $\frac{3}{4}$

C. $\frac{5}{12}$

D. none of these

Answer: A

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11. If A and B are events sucn that $P(A) = 0.3 P(B) = 0.2$ and $P(A \cap B) = 0.1$ then $P(\overline{A} \cap B) = ?$

A. 0.2

B. 0.1

C. 0.4

D. 0.5

Answer: B

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12. If $P(A) = \frac{1}{4}, P(B) = \frac{1}{3}$ and $P(A \cap B) = \frac{1}{5}$ then $P(\overline{B}/\overline{A}) = ?$

A. $\frac{11}{15}$

B. $\frac{11}{45}$

C. $\frac{23}{60}$

D. $\frac{37}{45}$

Answer: D

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13. If A and B are events such that $P(A) = 0.4, P(B) = 0,8$ and $P(B/A) = 0.6$ then $P(A/B) = ?$

A. 0.2

B. 0.3

C. 0.4

D. 0.5

Answer: B

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14. If A and B are independent events then $P(\overline{A}/\overline{B}) = ?$

A. $1 - P(A)$

B. $1 - P(B)$

C. $1 - P\left(A / \overline{B}\right)$

D. $-P\left(\overline{A} / \overline{B}\right)$

Answer: A

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15. If A and B ar two events such that $P(A \cup B) = \frac{5}{6}, P(A \cap B) = \frac{1}{3}$ and $P\left(\overline{B} = \frac{1}{2}\right)$ then the events A and B are

A. independent

B. dependet

C. mutually exclusive

D. none of these

Answer: A

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16. A die is thrown twice and the sum of the number appearing is observed to be 7 . What is the conditional probability that the number 2 has appeared at least once ?

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

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

C. $\frac{2}{7}$

D. $\frac{3}{5}$

Answer: B

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17. Two numbers are selected at random from integers 1 through 9. If the sum is even, find the probability that both the numbers are odd.

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

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

C. $\frac{4}{9}$

D. $\frac{5}{8}$

Answer: D

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18. In a class 40 % students read Mathematics, 25 % Biology and 15% both Mathematics and Biology. One student is selected at random. The probability that he reads Mathematics if it is known that he reads Biology is

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

B. $\frac{3}{5}$

C. $\frac{3}{8}$

D. $\frac{5}{8}$

Answer: B

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19. A family has 2 children.The probability that both of them are boys if it is known that one of them is a boy

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

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

C. $\frac{3}{4}$

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

Answer: A

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20. An unbiased die is tossed twice. Find the probability of getting a 4, 5 or 6 on the first toss and a 1, 2, 3 or 4 on the second toss.

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

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

C. $\frac{3}{4}$

D. $\frac{5}{6}$

Answer: A

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21. A coin is tossed 6 times . Find the probability of getting at least 3 heads .

A. $\frac{11}{16}$

B. $\frac{21}{32}$

C. $\frac{1}{18}$

D. $\frac{3}{64}$

Answer: B

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22. A coin is tossed 5 times. What is the probability that tail appears and odd number of times?

A. $\frac{3}{5}$

B. $\frac{2}{15}$

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

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

Answer: C

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23. A coin is tossed 5 times . What is the probability that head appears an even number of times ?

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

B. $\frac{3}{5}$

C. $\frac{4}{15}$

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

Answer: D

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24. 8 coins are tossed simultaneously . The probability of getting 6 head is

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

B. $\frac{57}{64}$

C. $\frac{37}{256}$

D. $\frac{249}{256}$

Answer: C

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25. A die is throws 5 times . If getting an odd number is a success , find the probability of getting at least 4 successes.

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

B. $\frac{7}{16}$

C. $\frac{3}{16}$

D. $\frac{3}{20}$

Answer: C

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26. In 4 throws with a pair of dice , what is the probability of throwing doublets at least twice ?

A. $\frac{7}{36}$

B. $\frac{17}{144}$

C. $\frac{19}{144}$

D. None of these

Answer: C

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27. A pair of dice is thrown 7 times. If getting a total of 7 is considered a success, what is the probability of (i) no success? (ii) 6 success? (iii) at least 6 success? (iv) at most 6 successes?

A. $\left(\frac{5}{6}\right)^7$

B. $\left(\frac{1}{6}\right)^7$

C. $\left(1-\frac{1}{6^7}\right)$

D. none of these

Answer: A

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28. The probability that a man can hit a target is $\frac{3}{4}$. He tries 5 times. The probability that he will hit the target at least three times is

A. $\frac{459}{512}$

B. $\frac{291}{364}$

C. $\frac{321}{464}$

D. none of these

Answer: A

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29. The probability of any ship return safely to the port is $\frac{1}{5}$. Find the probability that the returning out of 5 ships, at least 3 ships returns safely. It is given that returning ships are independently.

A. $\frac{1}{31}$

B. $\frac{3}{52}$

C. $\frac{181}{3125}$

D. $\frac{184}{3125}$

Answer: A

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30. The probability that an event A happens in one trial of an experiment, is 0.4 There independent trials of the experiments are performed. The probability that the event A happens atleast once, is

A. 0.784

B. 0.936

C. 0.964

D. none of these

Answer: A

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Exercise 32

1. A coin is tossed 6 times . Find the probability of getting at least 3 heads .

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2. A coin is tossed 5 times . What is the probability that a head appears an even number of times ?

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3. 7 coins are tossed simultaneously . What is the probability that a tail appears an odd number of times ?

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4. A coin is tossed 6 times. Find the probability of getting

(i) exactly 4 heads (ii) at least 1 head (iii) at most 4 heads .

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5. 10 coins are tossed simultaneously . Find the probability of getting

(i) exactly 3 heads (ii) not more than 4 heads

(iii) at least 4 heads .

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6. A die is thrown 6 times . If getting an even number is a success find the probability of getting .

(i) exactly 5 successes (ii) at least 5 successes

(iii) at most 5 successes .

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7. A die is thrown 4 times . Getting a 1 or a 6' is considered a success . Find probability of getting .

(i) exactly 3 successes (ii) at least 2 successes

(ii) at most 2 successes .

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8. Find the probability of 4 turning up at east once in two tosses of a fair die.

A. $\frac{8}{36}$

B. $\frac{9}{36}$

C. $\frac{10}{36}$

D. $\frac{11}{36}$

Answer: D

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9. पासों के एक जोड़े को 4 बार उछाला जाता है। यदि पासों पर प्राप्त अंकों का द्विक होना एक सफलता मानी जाती है तो 2 सफलताओं की प्रायिकता ज्ञात कीजिए।

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10. A pair of dice is thrown 7 times. If getting a total of 7 is considered a success, what is the probability of (i) no success? (ii) 6 success? (iii) at least 6 success? (iv) at most 6 successes?

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11. There are 6% defective items in a large bulk of item. Find the probability that sample of 8 items will include not more than one defective items.

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12. In a box containing 60 bulbs 6 are defective . What is the probability that out of a sample of 5 bulbs (i) none is defective (ii) exactly 2 are defective ?

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13. The probability that a bulb produced by a factory will fuse after 6 months of use is 0.05 . Find the probability that out of 5 such bulbs

(i) none will fuse after 6 months of use

(ii) at least one will fuse after 6 months of use

(iii) not more than one will fuse after 6 months of use.

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14. In the items produced by a factory there are 10% defective items A sample of 6 items is randomly chosen . Find the probability that this sample contains (i) exactly 2 defective items (ii) not more than 2 defective items (iii) at least 3 defective items .

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15. Assume that on an average one telephone number out of 15 , called between 3 p.m. and 4 p.m on weekdays will be busy . What is the

probability that if six randomly selected telephone numbers are called at least 3 of them will be busy?

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16. There cars participate in a race . The probability that any one of them has an accident is 0.1 . Find the probability that all the cars reach that finishing line without any accident .

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17. Past records show that 80% of the operations performed by a certain doctor were successful . If he performs 4 operations in a day what is the probability that at least 3 operations will be successful ?

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18. The probability of a man hitting man hitting target is 0.25. If he shoots 7 times, then what is the probability of his hittiing atleast twice ?

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19. एक बाधा दौड़ में एक प्रतियोगी को 10 बाधाएं पार करनी है इसकी प्रायिकता कि वह प्रत्यके बाधा को पार कर लेगा $\frac{5}{6}$ हैं इसकी क्या प्रायिकता है कि वह 2 से कम बाधाओं को गिरा देगा (नहीं पार कर पाएगा) ?

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20. A man can hit a bird once in 3 shots . On this assumption he fires 3 shots . What is the chance that at least one bird is hit ?

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21. If the probability that a man aged 60 will live to be 70 is 0.65 what is the probability that out of 10 men now 60 at least 8 will live to be 70 ?

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22. A bag contains 5 white 7 red and 8 black balls. If four balls are drawn one by one with replacement what is the probability that (i) none is the white (ii) all are white (ii) at least one is white ?

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23. A plicement fires 6 bullets at a burglar. The probability that the burglar will be hit by a bullet is 0.6 . What is the probability that the burglar is still unhurt ?

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24. A die is tossed thrice . A success I is or 6 on a toss. Find the mean and variance of successes.

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25. A die is thrown 100 times. Getting an even number is considered a successes. Find the mean and variance of successes.

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26. If the mean and variance of a binomial distribution are respectively 9 and 6, find the distribution.

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27. find the binomal distribution whose mean is 5 and variance is 2.5

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28. The mean and variance of a binomial distribution are 4 and 4/3 respectively, find $P(X \geq 1)$.

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29. For a binomial distribution the mean is 6 and the standard deviation is $\sqrt{2}$. Find the probability of getting 5 successes .

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30. In a binomial distribution the sum and product of the mean and the variance are $\frac{25}{3} and \frac{50}{3}$ respectively. Find the distribution.

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31. Obtain the binomial distribution whose mean is 10 and standard deviation is $2\sqrt{2}$

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32. Bring out the fallacy if any in the following statement :

The mean of a binomial distribution is 6 and its variance is 9.

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