MATHS

BOOKS - MAXIMUM PUBLICATION

PROBABILITY

Example

1. Determine P(E|F). A die thrown three times, E: '4 appears on the third toss`.F:'6 and 5 appears respectively on the two tosses'.

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2. Determine $P(E|F)$. Mother, father and son lineup at random for a photograph. E: 'son on one end', F: 'Father in middle`.

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3. A black and red dice are rolled. Find the conditional probability of obtaining a sum

greater than 9, given that the black die resulted in a 5

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4. A black and red dice are rolled. Find the conditional probability of obtaining a sum 8, given that the red die resulted in a number less than 4

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5. An instructor has a question bank consisting of 300 easy True/False question,200 difficult true/false questions, 500 easy multiple choice questions and 400 difficult multiple choice questions. If a question is selected from the test question bank, what is the probability that it will be an easy question given that it is a multiple choice question?

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6. Two cards are drawn at random . Without replacement from a pack of 52 playing cards. Find the probability that both the cards are black.

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7. if $P(A) = \frac{6}{11}, P(B) = \frac{5}{11}$ and $P(A \cup B) = \frac{9}{11}$ Find $P(A \cap B)$

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8. if $P(A) = \frac{6}{11}, P(B) = \frac{5}{11}$ and $P(A \cup B) = \frac{9}{11}$ Find P(A|B)

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9. if $P(A) = \frac{6}{11}, P(B) = \frac{5}{11}$ and $P(A \cup B) = \frac{9}{11}$ Find P(B|A)

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10. Event A and B are 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 independent.

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11. Consider two events such that P(A)=$\frac{1}{2}$, $P(A \cup B) = \frac{3}{5}$and P(B)=P. Find P, if A and B are independent events

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12. One card is drawn at random from a well shuffled pack of 52 cards. In which of the cases are the events E and F independent ? a) E: 'the card drawn is a spades.' F: 'the card drawn is an ace.'

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13. One card is drawn at random from a well shuffled pack of 52 cards. Are the events E and F independent ?

E: 'the card drawn is a black.'

F: 'the card drawn is a king.'

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14. One card is drawn at random from a well shuffled pack of 52 cards. Are the events E and F independent?

E: 'the card drawn is a king or a queen.' F: 'the card drawn is queen or a jack.'

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15. A Fair coin and an unbiased die are tossed. Let A be the event 'head appears on the coin' and B be the event '3 on the die'. Check whether A and B are independent events or not.

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16. Rani and joy appear in an interview for two vacancies in the same post. The probability of Rani's selection is $\frac{1}{7}$ and that of joy's selection

is $\frac{1}{5}$. what is the probability that Rani will not be selected ?

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17. Rani and joy appear in an interview for two vacancies in the same post. The probability of Rani's selection is $\frac{1}{7}$ and that of joy's selection is $\frac{1}{5}$. what is the probability that Both of them will be selected ?

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18. Rani and joy appear in an interview for two vacancies in the same post. The probability of Rani's selection is $\frac{1}{7}$ and that of joy's selection is $\frac{1}{5}$. what is the probability that None of them will be selected ?

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19. Find the probability distribution of number of heads in two tosses of a coin.

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20. Ten eggs are drawn successively with replacement from a lot containing 10% defective eggs. Find the probability that there is at least one defective egg.

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21. In a hostel 50% of the girls like tea, 40% like coffee and 20% like both tea and coffee

A girl is selected at random.

Find the probability that she likes neither tea or coffee .

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22. In a hostel 50% of the girls like tea, 40% like coffee and 20% like both tea and coffee.A girl is selected at random.If the girl likes tea,then find the probability that she likes coffee.

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23. In a hostel 50% of the girls like tea, 40% like coffee and 20% like both tea and coffee .A girl is selected at random.If she likes coffee then find the probability she likes tea.

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24. A box of oranges is inspected by examining three randomly selected oranges drawn without replacement. If all the three oranges are good, the box is approved for sale, otherwise it is rejected. Find the probability

that a box containing 15 oranges out of which 12 are good and 3 are bad ones will be approved for sale.

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25. Let two independent events A and B such that P(A)=0.3,P(B)=0.6.Find

P(A and B)

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26. Let two independent events A and B such that P(A)=0.3,P(B)=0.6

Find P(A and not B)

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27. Let two independent events A and B such that P(A)=0.3,P(B)=0.6

Find P(A or B)

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28. Let two independent events A and B such that P(A)=0.3,P(B)=0.6

Find P(neither A nor B)

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29. Two balls are drawn at random with replacement from a box containing 10 black and 8 red balls. Find the probability that both balls are red

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30. Two balls are drawn at random with replacement from a box containing 10 black and 8 red balls. Find the probability that the first ball is a black and the second is red

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31. Two balls are drawn at random with replacement from a box containing 10 black and 8 red balls. Find the probability that one of them is black and the other red

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32. Bag 1 contains 3 red and 4 black balls while another bag 2 contains 5 red and 6 black balls. One ball is drawn at random from one of the bags and it is found to be red. Find the probability that it was from Bag 2

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33. A bag contains 4 red and 4 black balls, another bag contains 2 red and 6 black balls.

One ball of the two bag is drawn at random and the ball is drawn the bag is found to be red. Find the probability that the ball is drawn from first bag

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34. In a factory which manufactures bolts, machines A,B and C manufacture respectively 25%, 35% and 40% of the bolts. Of their outputs 5%, 4% and 2% are defective bolts. A bolt is drawn at random from the product and

is found to be defective. What is probability that it is manufactured by the machine B ?

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35. Suppose 5% of men and 0.25% of women have grey hair. A grey haired person is selected at random. What is the probability of this person being male? Assume there are equal number of males and females.

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36. An Insurance company insured 2000 scooter drivers, 4000 car drivers and 6000 truck drivers. The probabilities of an accident are 0.01, 0.03 and 0.15 respectively. One of the insured persons meets with an accident. What is the probability that he is a scooter driver ?

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37. A factory has two machines A and B. past record shows that machine A produced 60% of the items of output and the machine B

produced 40% of the items. Future 2% of the items produced by machine A and 1% produced by machine B were defective. All the items are put into one stockpile and then one item is choosen at random from this and is found to be defective. what is the probability that it was produced by machine B ?

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38. Suppose a girl throws a die. If she gets a 5 or 6, she tosses a coin three times and notes

the number of heads. If she gets 1,2,3 or 4 she tosses a coin once and notes whether a head or tail is obtained. If she obtained exactly one head, what is the probability that she threw 1,2,3 or 4 with the die ?

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39. Vineetha and Reshma are competing for the post of school leader. The probability Vineetha to be elected is 0.6 and that of Reshma is 0.4 Futher if Vineetha is elected the

probability of introducing a new pattern of election is 0.7 and the corresponding probability is 0.3 , if reshma is elected. Find the probability that the new pattern of election is introduced by Reshma ?

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

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41. Find the probability distribution of the number of white balls drawn when three balls are drawn one by one without replacement from a bag containing 4 white and 6 red balls ?

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42. Two dice are thrown simultaneously. If X denotes the number of sixes, Find expectation of X. Also find the variance.

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43. A random variable X has the following probability distribution Determine K

X	0	1	2	3	4	5	6	7
P(X)	0	k	$2k$	$2k$	$3k$	k^2	$2k^2$	$7+k^2+k$

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44. A random variable X has the following probability distribution

Determine $P(X<3)$

X	0	1	2	3	4	5	6	7
P(X)	0	k	$2k$	$2k$	$3k$	k^2	$2k^2$	$7+k^2+k$

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45. A random variable X has the following probability distribution

Determine $P(X>6)$

X	0	1	2	3	4	5	6	7
P(X)	0	k	$2k$	$2k$	$3k$	k^2	$2k^2$	$7+k^2+k$

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46. if P(A)=$\frac{7}{13}$, P(B)=$\frac{9}{13}$,$P(A \cap B) = \frac{4}{13}$ then P(A|B) is.....a) $\frac{9}{4}$ b) $\frac{16}{13}$ c) $\frac{4}{9}$ d) $\frac{11}{13}$

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

B. $\frac{16}{13}$

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

D. $\frac{11}{13}$

Answer: C

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47. Probability of solving a specific problem independently by A and B are $\frac{1}{2}$ and $\frac{1}{3}$ respectively. If both try to solve the problem independently, then find the probability that the problem is solved ?

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48. probability of solving a specific problem independently by A and B are $\frac{1}{2}$ and $\frac{1}{3}$ respectively. If both try to solve the problem

independently, then Find the probability that exactly one of them solve the problem ?

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49. A and B are two events such that $P(A) = \frac{1}{5}$ and $P(A \cup B) = \frac{2}{5}$ Find P(B) if they are mutually exclusive. a) $\frac{1}{5}$ b) $\frac{2}{5}$ c) $\frac{3}{5}$ d) $\frac{4}{5}$

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

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

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

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

Answer: A

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50. A box contains 3 red and 4 blue balls. Two balls are drawn one by one without replacement. Find the probability of getting both balls red.

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51. Three cards are drawn successively without replacement from a pack of 52 cards. What is the probability that first two cards are queen and the third is king.

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52. 60 shirts of different colours are on sale. If one shirt is chosen at random

what is the probability that it is red ?

	Plain Red	Plain Blue	Check Blue
Small	8	5	3
Medium	8	2	10
Large	2	3	5
Extra Large	4	5	5

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53. 60 shirts of different colours are on sale. If one shirt is chosen at random

what is the probability that it is plain and

extra-large ?

	Plain Red	Plain Blue	Check Blue
Small	8	5	3
Medium	8	2	10
Large	2	3	5
Extra Large	4	5	5

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54. 60 shirts of different colours are on sale. If one shirt is chosen at random

what is the probability that it is small, given

that it is blue ?

	Plain Red	Plain Blue	Check Blue
Small	8	5	3
Medium	8	2	10
Large	2	3	5
Extra Large	4	5	5

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55. 60 shirts of different colours are on sale. If one shirt is chosen at random

if A is the event 'the shirt is medium' and B is the event 'the shirt is blue'. Are the events A

and B independent ?

	Plain Red	Plain Blue	Check Blue
Small	8	5	3
Medium	8	2	10
Large	2	3	5
Extra Large	4	5	5

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56. From a box containing balls numbered from 1 to 100 , one ball is drawn at random. The events X and Y are as follows.

X: A perfect square is drawn Y: An even

number is drawn

Find P(X) and P(Y).

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57. From a box containing balls numbered from 1 to 100 , one ball is drawn at random. The events X and Y are as follows. X: A perfect square is drawn Y: An even number is drawn .compute P(X|Y)

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58. From a box containing balls numbered from 1 to 100 , one ball is drawn at random. The events X and Y are as follows.

X: A perfect square is drawn Y: An even number is drawn

Are X and Y independent ? Justify.

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59. The probability of three mutually exclusive events A, B and C are given by $\frac{2}{3}, \frac{1}{4}, \frac{1}{6}$

respectively Is this statement a)True? b)False?

c)Cannot be said? d)Data not sufficient?

A. True?

B. False?

C. Cannot be said?

D. Data not sufficient?

Answer: B

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60. A husband and wife appear in an interview for two vacancies in the same post. The probability of husbands's selection is $\frac{1}{7}$ and that of wife's selection is $\frac{1}{5}$. what is the probability that only one of them will be selected ?

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61. A husband and wife appear in an interview for two vacancies in the same post. The

probability of husbands's selection is $\frac{1}{7}$ and that of wife's selection is $\frac{1}{5}$. what is the probability that None will be selected ?

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62. Find $P(A \cap B)$ If A and B are independent events with P(A)=$\frac{1}{5}$ and P(B)=$\frac{5}{8}$. a) $\frac{6}{13}$ b) $\frac{33}{40}$ c) $\frac{1}{8}$ d) $\frac{5}{8}$

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

B. $\frac{33}{40}$

C. $\frac{1}{8}$

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

Answer: C

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63. An unbiased die is thrown twice. Let the event A be getting prime number in the first throw and B be the event of getting an even number in the second throw. Check the independence of the events A and B

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64. The probability of solving a problem independently by A and B are $\frac{1}{3}$ and $\frac{1}{4}$ respectively. Find the probability that exactly one of them solves the problem.

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65. A set of events

$E_1, E_2, \ldots\ldots\ldots E_n$

are said to be a partition of the sample space, then which of the following conditions is always not true

A. $E_1 \cup E_2 \cup \ldots\ldots \bigcup E_n = S$

B. $E_1 \cap E_n = \phi$

C. $P(E_1) > 0$

D. $P(E_1) \geq P(E_n)$

Answer: D

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66. A person has undertaken a business. The probabilities are 0.80 that there will be a crisis, 0.85 that the business will be completed on time if there is no crisis and 0.35 that the business will be completed on time if there is a crisis. Determine the probability that the business will be complete on time

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67. A box contains 5 red and 10 black balls. A ball is drawn at random, its colour is noted

and is returned to the box. More over 2 additional balls of the colour drawn are put in the box and then a ball is drawn.what is the probability that the second ball is red.

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68. Bag 1 contains 5 red and 6 black balls. Bag2 contains 7 red and 5 black balls. One ball is drawn at random from one of the bags and it is found to be red. Find the probability that it was drawn from bag 1.

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69. A card from a pack of 52 cards is lost. From the remaining cards of the pack, two cards are drawn and are found to be both diamonds. Find the probability of the lost card being diamond.

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70. If X denotes number of heads obtained in tossing two coins. Then which of the following

is false a) X(HH) = 2 b)X(HT) = 1 c)X(TH) = 0 d)X(TT) = 0

A. X(HH) = 2

B. X(HT) = 1

C. X(TH) = 0

D. X(TT) = 0

Answer: C

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71. Find the probability distribution of the number of tails in the simultaneous toss of two coins.

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72. A coin is tossed so that the head is 3 times as likely to occur as tail. If the coin is tossed twice, Find the probability distribution of number of tails.

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73. If a fair coin is tossed 10 times, Find the probability of Exactly 6 heads.

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74. If a fair coin is tossed 10 times, Find the probability of At least 6 heads.

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75. If a fair coin is tossed 10 times, Find the probability of At most 6 heads.

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76. Five cards are drawn successively with a replacement from a pack of 52 cards. What is the probability that All the 5 cards are spades ?

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77. Five cards are drawn successively with a replacement from a pack of 52 cards. What is the probability that Only 3 cards are spade ?

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78. Five cards are drawn successively with a replacement from a pack of 52 cards. What is the probability that none is a spade ?

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79. Find the probability distribution, Mean and Variance of the number of success in two tosses of a die, where a success is defined as number greater than 4

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80. Find the probability distribution, Mean and Variance of the number of success in two tosses of a die, where a success is defined as 6 appears on at least on one die

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81. If A and B are two events such that $A \subset B$ and $P(A) \neq 0$ then P(A/B) is

A. $P\frac{A}{P}(B)$

B. $P\frac{B}{P}(A)$

C. $\frac{1}{P}(A)$

D. $\frac{1}{P}(B)$

Answer:

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82. There are two identical bags. Bag | contains 3 red and 4 black balls while bag || contains 5 red and 4 black balls. One ball is drawn at random from one of the bags.

Find the probability that all the ball drawn are red

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83. There are two identical bags. Bag I contains 3 red and 4 black balls while bag II contains 5

red and 4 black balls. One ball is drawn at random from one of the bags.

If the balls drawn is red what is the probability that it was drawn from bag I?

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84. Consider the following probability distribution of a random variable X Find the value of K

X	0	1	2	3	4
P(X)	$\frac{1}{16}$	$\frac{2}{16}$	K	$\frac{5}{16}$	$\frac{1}{16}$

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85. Consider the following probability distribution of a random variable X Determine the Mean and Variance of X

X	0	1	2	3	4
P(X)	$\frac{1}{16}$	$\frac{2}{16}$	K	$\frac{5}{16}$	$\frac{1}{16}$

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86. Suppose 10 cards numbered 1 to 10 are placed in a box and shuffled and one card is

drawn at random If A is the event that the number on the card is even, then write A

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87. Suppose 10 cards numbered 1 to 10 are placed in a box and shuffled and one card is drawn at random If A is the event that the number on the card is even, B is the event that the number on the card is more than 3, Find $P(A|B)$

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88. P(A)=$\frac{5}{12}$, P(B)=$\frac{7}{12}$, $P(A \cap B) = \frac{1}{4}$ .Find P(A|B)

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89. A and B try independently to solve a problem. probability that A solves it is $\frac{1}{3}$ & that B is $\frac{3}{5}$. Find the probability that the problem is solved.

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90. If X is a random variable whose possible values $X_1, X_2, \ldots\ldots, X_n$ are occur with probabilities $P_1, P_2, \ldots\ldots, P_n$ respectively, then E(X)=.....

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91. A husband and wife appears for an interview for 2 posts. The probability of husband selection is $\frac{1}{7}$ and that of wife is $\frac{1}{5}$. what is the probability that one is selected ?

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92. Two balls are drawn at random with replacement from a box containing 10 black and 8 red balls. Find the probability that both balls are red

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93. Two balls are drawn at random with replacement from a box containing 10 black

and 8 red balls. Find the probability that one of them is black and the other is red.

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94. For two independent events A and B, which of the following pair of events need not be independent ? a)A', B' b)A, B' c)A', B d) $A - B, B - A$

A. A', B'

B. A, B'

C. A', B

D. $A - B, B - A$

Answer: D

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95. If P(A) = 0.6,P(B) = 0.7 and

$P(A \cup B) = 0.9$, then find P(A/B) and P(B/A)

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96. The probability disribution of a random variable X is given below

Find the value of K

X	0	1	2	3	4	5
P(X)	k	$2k$	$3k$	$4k$	$5k$	$5k$

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97. The probability disribution of a random variable X is given below

Find the mean and variance of the variable

X	0	1	2	3	4	5
P(X)	k	$2k$	$3k$	$4k$	$5k$	$5k$

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98. An urn contains 8 white and 6 black balls. Two are drawn from the urn one after the other without replacement. What is the probablility that both drawn balls are white ?

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99. Prove that variance

$E\left(X^2\right) - [E(X)]^2$

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100. For any two events A and B, write the expression for P(A|B).

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101. In a bulb factory, machine A,B and C manufactures 60%, 30% and 10% bulbs respectively. 1%, 2% and 3% of the bulbs produced by A, B and C respectively are defective. A bulb is drawn at random from the

total production and found to be defective. Find the probability that this had been produced from machine A.

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102. Two balls are drawn with replacement from a box containing 10 black and 8 red balls. Find the probability that one of them is black and the other is red.

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103. Find the probability of getting 5 exactly twice in 7 throw of a die.

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104. Write the probability function of Binomial Distribution

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105. 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 of the number of defective bulbs if 3 bulbs are drawn at random.

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106. Two balls are drawn with replacement from a box containing 10 black and 8 red balls.

Find the probability that one of them is black and the other is red.

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107. Find the probability of getting 5 exactly twice in 7 throw of a die.

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

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109. Bag I contains 3 red and 4 black balls while another bag II contains 5 red and 6 black balls. One ball is drawn at random from one of the bag it is found to be red. Find the probability that it was drawn from bag II.

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110. If A and B are independent events, Prove that $\overline{A}$ and $\overline{B}$ are independent

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111. A box contains 30 defective bulbs and 30 non-defective bulbs. Two bulbs are drawn at random. The event A and B are defined as follows. A:'first bulb is defective.' B: 'the second bulb is non defective.' Find probability of A

and B. prove that A and B are independent events.

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112. In a factory which manufacture bulbs,machine X, Y and Z manufactures respectively 25%, 35% and 40% of the bulbs. Of the output 1%, 2% and 3% are respectively defective bulbs. A bulb is drawn at random and found to be defective. What is the

probability that it is manufactured by machine Y ?

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113. A and B try to solve a problem independently. The probability that A solves the problem is1/2 and that of B solves the problem is1/3. Find the probabilty that Both of them solved the problem.

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114. A and B try to solve a problem independently. The probability that A solves the problem is1/2 and that of B solves the problem is1/3. Find the probabilty that the problem is solved.

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115. If A and B are two independent events, then

Prove that A and B' are independent events.

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116. If A and B are two independent events, then

show that the probability of occurrence of at least one of A and B is

$1 - P(A')P(B')$

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117. There are two identical boxes. Box I contains 5 red and 4 black balls, while box II

contains 3 red and 3 black balls. A person choose a box at random and takes out a ball Find the probability that the ball drawn is red.

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118. There are two identical boxes. Box |contains 5 red and 4 black balls, while box || contains 3 red and 3 black balls. A person choose a box at random and takes out a ball If the ball drawn is black, what is the probability that it is drawn from box ||

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119. If P(A) = 0.8, P(B) = 0.5, P(B/A) = 0.4 then find $P(A \cup B)$

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120. If a fair coin is tossed 10 times, then find the probability of getting exactly 6 heads.

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121. If P(A) = 0.3, P(B) = 0.4, then the value of $P(A \cup B)$ where A and B are independent events a)0.48 b)0.51 c)0.52 d)0.58

A. 0.48

B. 0.51

C. 0.52

D. 0.58

Answer: D

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122. A card from a pack of 52 cards is lost. From the remaining cards of the pack, two cards are drawn and are found to be both diamonds. Find the probability of the lost card being diamond.

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123. A pair of dice is thrown 4 times. If getting a doublet is considered as a success,find the probability of two successes

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124. A pair of dice is thrown 4 times. If getting a doublet is considered as a success.Find the probability of getting a doublet.

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125. A pair of dice is thrown 4 times. If getting a doublet is considered as a success.

Hence find the probability of getting two success.

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126. State and Prove the theorem of total probability

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127. If a fair coin is tossed 10 times, what is the probability that the outcome is exactly 6 heads ?

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128. 3 coin are tossed and X be the number of heads turning up. Write probability distribution of X

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129. There are 5% defective items in a large bulk of items. What is the probability that a sample of 10 items will include not more than one defective item ?

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130. A class 15 students whose ages are 14,17,15,14,21,17,19,20,16,18,20,17,16,19 and 20 years. One student is selected such that each has the same chance of being selected, the age X of the selected student is recorded.

write the probability distribution of X

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131. A class has 15 students whose ages are 14,17,15,14,21,17,19,20,16,18,20,17,16,19 and 20 years. One student is selected such that each has the same chance of being selected, the age X of the selected student is recorded.

Find E(X).

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132. A class has 15 students whose ages are 14,17,15,14,21,17,19,20,16,18,20,17,16,19 and 20

years. One student is selected such that each has the same chance of being selected, the age X of the selected student is recorded.

Find Var(X).

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133. An unbiased die is thrown twice. Let A be the event 'odd number on the first throw' and B be the event 'odd number on the second throw'. Check the independence of the events A and B

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134. If P(A) = 0.8, P(B) = 0.5, P(B/A) = 0.4, Find

$P(A \cap B)$

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135. If P(A) = 0.8, P(B) = 0.5, P(B/A) = 0.4, Find

P(A/B)

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136. If P(A) = 0.8, P(B) = 0.5, P(B|A) = 0.4, Find $P(A \cup B)$

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137. A and B are two events such that P(A)=0.8, P(B)=0.5 and P(B|A)=0.4, then find P(A|B)

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138. Find the mean and variance of the number obtained on a throw of an unbiased die.

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139. Two events E and F are such that P(E)=0.6, P(F)=0.2 and

`P(EUF)=0.68. Are E and F independent ?

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140. A die is thrown 6 times. If getting an odd number is a success, what is the probability of getting 5 successes ?

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141. A die is thrown 6 times. If getting an odd number is a success, what is the probability of getting

At least 5 successes ?

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142. A die is thrown 6 times. If getting an odd number is a success, what is the probability of

getting

At most 5 successes ?

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143. A die is thrown thrice. Find the probability of getting an odd number atleast once.

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144. Two cards are drawn successively with replacement from a pack of 52 cards. Find the

probability distribution of the number of aces.

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