



MATHS

BOOKS - A N EXCEL PUBLICATION

PROBABILITY

Question Bank

1. For two events A and B, $P(A) = 1/3 = 1 - P(B)$ and $P(B/A) = 1/4$

Find $P(A \cap B)$ and $P(B)$



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2. For two events A and B, $P(A)=1/3=1-P(B)$ and $P(B/A)=1/4$

Find $P(A/B)$



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3. A family has two children. What is the probability that both the children are boys given that at least one of them is a boy?



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



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5. Consider the experiment of throwing a die, if a multiple of 3 comes up throw the die again and if any other number comes toss a coin.

Write the sample space.



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6. Consider the experiment of throwing a die, if a multiple of 3 comes up throw the die again and if any other number comes toss a coin.

Find the conditional probability of the event "the coins shows a tail" given that "at least one die shows a 2".



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7. Given that E and F are events such that $P(E) = 0.6$, $P(F) = 0.3$ and $P(E \cap F) = 0.2$. Find $P(E/F)$.





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8. Given that E and F are events such that $P(E) = 0.6, P(F) = 0.3$ and $P(E \cap F) = 0.2$. Find $P(F/E)$.



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9. Compute $P(A/B)$ if $P(B) = 0.5$ and $P(A \cap B) = 0.32$



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10. If $P(A) = 0.8$, $P(B) = 0.5$ and $P(B/A) = 0.4$, find $P(A \cap B)$



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11. If $P(A) = 0.8$, $P(B) = 0.5$ and $P(B/A) = 0.4$, find $P(A/B)$



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12. If $P(A) = 0.8$, $P(B) = 0.5$ and $P(B/A) = 0.4$, find $P(A \cap B)$



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13. Evaluate $P(A \cap B)$ if

$2P(A)=P(B)=5/13$ and $P(A/B)=2/5$.



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14. If $P(A) = 6/11, P(B) = 5/11$ and

$P(A \cap B) = 7/11$, find

$P(A \cap B)$



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15.

If

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

,find $P(A/B)$



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16.

If

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

,find $P(A/B)$



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17. A coins is tossed three times,where

E:head on third toss,F: heads on first two tosses

find $P(E/F)$



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18. A coins is tossed three times,where E:atleast

two heads,F: atmost two heads. Find $P(E/F)$



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19. A coins is tossed three times,where E:atmost two tails, F: atleast one tail.

Find $P(E/F)$ in each case above.



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20. Two coins are tossed once,where E: tail appears on one coin, F: one coins shows head .

Find $P(E/F)$



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21. Two coins are tossed once, where

E: no tail appears, F: no head appears. Find $P(E/F)$

in each case above.



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22. 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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23. Mother, Father and Son line up at random for a family picture. E : son on one end, F: Father in middle. Find $P(E/F)$.



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24. 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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25. 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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26. A fair die is rolled. Consider the events $E = \{1,3,5\}$, $F = \{2,3\}$ and $G = \{2,3,4,5\}$. Find $P(E/F)$ and $P(F/E)$



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27. A fair die is rolled. Consider the events $E = \{1,3,5\}$, $F = \{2,3\}$ and $G = \{2,3,4,5\}$. Find $P(E/G)$ and $P(G/E)$



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28. A fair die is rolled. Consider the events $E = \{1,3,5\}$, $F = \{2,3\}$ and $G = \{2,3,4,5\}$. Find

$$P\left(\frac{E \cap F}{G}\right) \text{ and } P\left(\frac{E \cup F}{G}\right)$$



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29. Assume that each born child 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 the youngest is a girl



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30. Assume that each born child 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

atleast one is a girl



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31. 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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32. Given that the two numbers appearing on throwing two dice are different. Find the probability of the event "the sum of numbers on the dice is 4"



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33. Consider the experiment of throwing a die, if a multiple of 3 comes up, throw the die again and if any other number comes, a coin. Find the

conditional probability of the event "the coin shows a tail" given that "at least one die shows a 3"



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34. Choose the correct answer. If $P(A) = 1/2$, $P(B) = 0$, then $P(A/B)$ is

A. 0

B. 4/228

C. not defined

D. 1

Answer:



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35.

If

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

,find $P(A/B)$

Choose the correct answer.If A and B are events such that $P(A/B)=P(B/A)$,then

A. $A \subset B$ but $A \neq B$

B. $A = B$

$$C. A \cap B = \phi$$

$$D. P(A) = P(B)$$

Answer:



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36. A bag contains 8 red and 5 white balls. Three balls are drawn at random. Find the probability that all the three balls are white.



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37. A bag contains 8 red balls and 5 white balls.

Two successive draws of 3 balls

are made without replacement. Find the

probability that the first drawing

will give 3 white balls and the second 3 red balls.



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38. A bag contains 8 red balls and 5 white balls.

Two successive draws of 3 balls

are made without replacement. Find the

probability that the first drawing

will give 3 white balls and the second 3 red balls.



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39. A bag contains 5 white balls and 3 black balls. Two balls are drawn at random one after the other without replacement. Find the probability that the ball drawn first is white.



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40. A bag contains 5 white balls and 3 black balls. Two balls are drawn at random one after the

other without replacement. Find the probability that the ball drawn first is white.



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41. A bag contains 5 white balls and 3 black balls. Two balls are drawn at random one after the other without replacement.

Find the probability that the first draw gives a white ball and the second draw gives a black ball



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42. One bag contains 5 white and 3 black balls. Another bag contains 7 white and 8 black balls. A ball is transferred from the first bag to the second and then a ball is drawn from the second. Find the probability that the ball drawn from the second bag is white



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43. A die thrown. If E is the event 'the number appearing is a multiple of 3' and F be the event

'the number appearing is even' then find whether E and F are independent ?



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44. Two dice are thrown.If A is the event of getting the sum of the numbers on dice as 11 and B is the event of getting a number other than 5 on the first die.Find $P(A \text{ and } B)$.Are A and B are independent events?



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45. If $P(A) = 3/5$ and $P(B) = 1/5$, find

$P(A \cap B)$ if A and B are independent events.



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46. 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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47. 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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48. 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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49. A die marked 1,2,3 in red and 4,5,6 in green is tossed. Let A be the event "the number is even" and B be the event."the number is red".Are A and B are independent?



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50. Let E and F be events with

$$P(E) = 3/5, P(F) = 3/10 \text{ and}$$

$P(E \cap F) = 1/5$. Are E and F independent?



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51. Given that the events A and B are such that

$$P(A) = 1/2, P(A \cup B) = 3/5 \text{ and}$$

$P(B) = p$. Find p if they are

mutually exclusive



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52. Given that the events A and B are such that $P(A)=1/2, P(A \cap B)=3/5$ and $P(B) = P$. Find p if they are independent.



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53. Let A and B be independent events with $P(A) = 0.3$ and $P(B) = 0.4$. Find, $P(A \cap B)$



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54. Let A and B be independent events with $P(A) = 0.3$ and $P(B) = 0.4$. Find,

$$P(A \cup B)$$



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55. Let 'A' and 'B' be independent events with ' $P(A)=0.3$ ' and ' $P(B)=0.4$ '. Find

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

ii) ' $P(A \cup B)$ '

iii) ' $P(A | B)$ '

iv) ' $P(B | A)$ '



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56. Let 'A' and 'B' be independent events with 'P(A)=0.3' and 'P(B)=0.4'. Find

i) $P(A \cap B)$

ii) $P(A \cup B)$

iii) $P(A | B)$

iv) $P(B | A)$



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57. If A and B are two events such that

$P(A) = 1/4$, $P(B) = 1/2$ and

$p(A \cap B) = 1/8$, find $P(\text{not } A \text{ and not } B)$.



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58. Event A and B are such that $P(A) = \frac{1}{2}$
 $P(B) = \frac{7}{12}$ and $P(\text{not } A \text{ or not } B) = \frac{1}{4}$. State
whether A and B are independent.



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59. Let two independent events A and B such that

$P(A) = 0.3, P(B) = 0.6$. Find

$P(A \text{ and } B)$



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60. Let two independent events A and B such that

$$P(A)=0.3, P(B)=0.6$$

Find $P(A \text{ and not } B)$



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61. Let two independent events A and B such that

$$P(A)=0.3, P(B)=0.6$$

Find $P(A \text{ or } B)$



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62. Given two independent events A and B such that $P(A) = 0.3$, $P(B)=0.6$. find $P(\text{neither A nor B})$



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



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64. 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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65. 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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66. 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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67. Probability of solving specific problem independently. If both try to solve the problem independently, find the probability that the problem is solved





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68. Probability of solving specific problem independently. If both try to solve the problem independently, find the probability that exactly one of them solves the problem



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69. 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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70. 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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71. 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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72. In a ladies hostel, 60% of the students read Hindi newspaper, 40% read English newspaper and

20% read both Hindi and English newspapers. A student is selected at random.

Find the probability that she reads neither Hindi nor English newspapers.



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73. In a ladies hostel, 60% of the students read Hindi newspaper, 40% read English newspaper and 20% read both Hindi and English newspapers. A student is selected at random. If she reads Hindi newspaper, find the probability that she reads English newspaper.



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74. In a ladies hostel, 60% of the students read Hindi newspaper, 40% read English newspaper and 20% read both Hindi and English newspapers. A student is selected at random.

If she reads English newspaper, find the probability that she reads Hindi newspaper.



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75. Choose the correct answer:

The probability of obtaining an even prime

number on each die, when a pair of dice is rolled
is

a) 0

b) $1/3$

c) $1/12$

d) $1/36$

A. 0

B. $1/3$

C. $1/12$

D. $1/36$

Answer: D





76. Two events A and B will be independent, if

a) A and B are mutually exclusive

b) $P(A'B') = [1 - P(A)] [1 - P(B)]$

c) $P(A) = P(B)$

d) $P(A) + P(B) = 1$

A. A and B are mutually exclusive

B. $P(A' B') = [1 - P(A)] [1 - P(B)]$

C. $P(A) = P(B)$

D. $P(A) + P(B) = 1$

Answer: B



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77. A doctor is to visit a patient. From the past experience, it is known that the probabilities that he will come by train, bus, scooter or by other means of transport are respectively $\frac{3}{10}$, $\frac{1}{5}$, $\frac{1}{10}$ and $\frac{2}{5}$. The probabilities that he will be late are $\frac{1}{4}$, $\frac{1}{3}$, and $\frac{1}{12}$, if he comes by train, bus and scooter respectively, but if he comes by other means of transport, then he will not be late.

When he arrives, he is late. What is the probability that he comes by train?



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78. Given three identical boxes I, II and III, each containing two coins. In box I, both coins are gold coins, in box II, both are silver coins and in the box III, there is one gold and one silver coin. A person chooses a box at random and takes out a coin. If the coin is of gold, what is the probability that the other coin in the box is also of gold?



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79. A man is known to speak truth 3 out of 4 times. He throws a die and reports that it is a six. Find the probability that it is actually a six.



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80. An urn contains 5 red and 5 black balls. A ball is drawn at random, its colour is noted and is returned to the urn. Moreover, 2 additional balls of the colour drawn are put in the urn and then a

ball is drawn at random. What is the probability that the second ball is red?



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81. A bag contains 4 red and 4 black balls . Another bag contains 2red and 5 black balls. One of the two bags is selected at random and a ball is drawn from the bag and which is found to be red . Find the probability that the ball is drawn from first bag.



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82. Of the students in a college, it is known that 60% reside in hostel and 40% are day scholars (not residing in hostel). Previous year results report that 30% of all students who reside in hostel attain A grade and 20% of day scholars attain A grade in their annual examination. At the end of the year, one student is chosen at random from the college and he has an A grade, what is the probability that the student is a hostlier?



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83. In answering a question on a multiple choice test, a student either knows the answer or guesses. Let $\frac{3}{4}$ be the probability that he knows the answer and $\frac{1}{4}$ be the probability that he guesses. Assuming that a student who guesses at the answer will be correct with probability $\frac{1}{4}$. What is the probability that the student knows the answer given that he answered it correctly?



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84. A laboratory blood test is 99% effective in detecting a certain disease when it is in fact, present. However result for 0.5% of the healthy person tested (i.e., if a healthy person is tested, then with probability 0.005, the test will imply he has the disease). If 0.1% of the population actually has the disease, what is the probability that a person has the disease given that his test result is positive?



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85. 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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86. 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 chosen 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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87. Two groups are competing for the position on the Board of directors of a Corporation. The probabilities that the first and the second groups

wil win are 0.6 and 0.4 respectively. Further, if the first group wins, the probability of introducing a new product is 0.7 and the corresponding probability is 0.3 if the second group wins. Find the probability that the new product introduced was by the second group.



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88. 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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89. A manufacturer has three machine operators A,B and C. The first operator A produces 1% defective items,whereas the other two operator B and C produce 5% and 7% defective items respectively. A is on the job for 50% of the time,B is on the job 30% of the time and C is on the job for 20% of the time. A defective item is

produced, what is the probability that it was produced by A?



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90. 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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91. Probability that A speaks truth is $\frac{4}{5}$. A coin tossed. A reports that a head appears. The probability that actually there was head is a) $\frac{4}{5}$ b) $\frac{1}{2}$ c) $\frac{1}{5}$ d) $\frac{2}{5}$



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92. If A and B are two events such that $A \subset B$ and $P(B) \neq 0$, then which of the following is correct? a) $P(A | B) = \frac{P(B)}{P(A)}$ b) $P(A | B) < P(A)$ c) $P(A | B) \geq P(A)$ d) None of these

A. $P(A/B)=P(B)/P(A)$

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

C. $P\left(\frac{A}{B}\right) > P(A)$

D. none of these

Answer: C



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



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94. A random variabe x has the following probability distribution.

Find Value of K .

x	0	1	2	3	4	5	6	7	8
$P(x)$	K	$3K$	$5K$	$7K$	$9K$	$11K$	$13K$	$15K$	$17K$



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95. A random variabe x has the following probability distribution.

x	0	1	2	3	4	5	6	7	8
$P(x)$	K	$3K$	$5K$	$7K$	$9K$	$11K$	$13K$	$15K$	$17K$

$$P(x < 3), P(x \geq 3), P(0 < x < 5)$$



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96. Find the mean and variance of the number of heads in the two tosses of a coin.



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97. State whether the following is a probability distribution of a random variable. Give reason for

your answer.

x	0	1	2
$P(x)$	0.4	0.4	0.2



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98. State whether the following is a probability distribution of a random variable. Give reason for your answer.

x	0	1	2	3	4
$P(x)$	0.1	0.5	0.2	-0.1	0.3



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99. State whether the following is a probability distribution of a random variable. Give reason for your answer.

y	-1	0	1
$P(y)$	0.6	0.1	0.2



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100. State whether the following is a probability distribution of a random variable or not. Give

reason for your answer.

z	3	2	1	0	-1
$P(z)$	0.3	0.2	0.4	0.1	0.05



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101. An urn contains 5 red and 2 black identical balls. Two balls are randomly drawn. Let X represent the number of black balls. What are the values of X ? Is X a random variable?



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102. Let X represent the absolute difference between the number of heads and the number of tails obtained when a coin is tossed 6 times. What are the possible values of X ?



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



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104. Find the probability distribution of number of tails in the simultaneous tosses of three coins



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105. Find the probability distribution of number of heads in four tosses of a coin



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106. Find the probability distribution of the number of successes in two tosses of a die where success is defined as number greater than 4



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107. Find the probability distribution of the number of successes in two tosses of a die where success is defined as six appears on atleast one die



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108. From a lot of 30 bulbs which include 6 defectives, a sample of 4 bulbs is drawn at random with replacement. Find the probability distribution of the number of defective bulbs



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109. 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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110. 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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111. 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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112. 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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113. A random variable X has the following probability distribution:

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

find $P(0 < X < 3)$



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114. The random variable X has a probability distribution $P(X)$ of the following form,

where k is some number. Determine the value of k

$$P(x) = \begin{cases} k, & \text{if } x=0 \\ 2k, & \text{if } x=1 \\ 3k, & \text{if } x=2 \\ 0, & \text{otherwise} \end{cases}$$

$$2k, \text{ if } x=1$$

$$3k \text{ if } x=2$$

$$0, \text{ otherwise}$$



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115. The random variable X has a probability distribution $P(X)$ of the following form,

where k is some number. Find $P(X < 2)$

$$P(x) = \begin{cases} k, & \text{if } x=0 \end{cases}$$

$$2k, \text{ if } x=1$$

$$3k \text{ if } x=2$$

$$0, \text{ otherwise}$$



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116. The random variable X has a probability distribution $P(X)$ of the following form,

where k is some number. Find $P(X \leq 2)$ and

$$P(X \geq 2)$$

$$P(x) = \begin{cases} k, & \text{if } x=0 \\ \end{cases}$$

$$2k, & \text{if } x=1$$

$$3k & \text{if } x=2$$

$$0, & \text{otherwise}$$



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117. Find the mean number of heads in three tosses of a fair coin.



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



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119. Two numbers are selected at random (without replacement) from the first six positive integers. Let 'X' denote the larger of the two numbers obtained. Find $E(X)$.



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120. Let 'X' denote the sum of the numbers obtained when two fair dice are rolled. Find the variance and standard deviation of 'X'.



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121. 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 $\text{Var}(X)$.



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122. In a meeting, 70% of the members favour and 30% oppose a certain proposal. A member is selected at random and we take $X = 0$, if he

opposed, and $X = 1$, if he is in favour. Find $E(X)$ and $Var(X)$.



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123. Choose the correct answer in each of the following The mean of the numbers obtained on throwing a die having written 1 on three faces, 2 on two faces and 5 on one face is

A. 1

B. 2

C. 5

D. 44263

Answer: B



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124. Suppose that two cards are drawn at random from a deck of cards.

Let X be the number of aces obtained. Then the value of $E(X)$ is

A. $37/221$

B. $5/13$

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

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

Answer: D



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125. A box contains 5 white, 7 red and 8 black balls. If four balls are drawn by one with replacement what is the probability that All are white?



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126. A box contains 5 white, 7 red and 8 black balls. If four balls are drawn by one with replacement what is the probability that None is white?



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127. A die is tossed thrice. Getting an even number is considered as successes. What is the mean and variance of the binomial distribution?



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128. Find the binomial distribution for which the mean is 4 and variance 3. Also find $P(x \geq 1)$?



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129. 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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130. 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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131. 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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132. 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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133. 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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134. 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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135. 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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136. 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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137. The probability that a bulb produced by a factory will fuse after 150 days of use is 0.05. Find the probability that out of 5 such bulbs. none



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138. The probability that a bulb produced by a factory will fuse after 150 days of use is 0.05. Find the probability that out of 5 such bulbs, not more than one



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139. The probability that a bulb produced by a factory will fuse after 150 days of use is 0.05. Find the probability that out of 5 such bulbs, more than one



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140. The probability that a bulb produced by a factory will fuse after 150 days of use is 0.05. Find the probability that out of 5 such bulbs, at least one will fuse after 150 days of use



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141. A bag consists of 10 balls each marked with one of the digits 0 to 9 . If four balls are drawn successively with replacement from the bag, what

is the probability that none is marked with the digit 0?



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142. In an examination 20 question of true false type are asked suppose a student tosses a fair coin to determine his answer to each question if the coins falls heads he answers true if it falls tail he answers false find the probability that he answers at least 12 question correctly.



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143. Suppose X has a binomial distribution $B(6, 1/2)$ show that $X=3$ is the most likely outcome.



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144. On a multiple choice examination with three possible answers for each of the five questions what is the probability that a candidate would get four or more correct answers just by guessing?



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145. A person buys a lottery ticket in 50 lotteries , in each of which his chance of winning prize is $\frac{1}{100}$.What is the probability that he will win a prize at least once.



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146. A person buys a lottery ticket in 50 lotteries ,in each of which his chance of winning prize is $\frac{1}{100}$.What is the probability that he will win a prize exactly once.



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147. A person buys a lottery ticket in 50 lotteries in each of which his chance of winning prize is $\frac{1}{100}$ what is the probability that he will win a prize at least twice.



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



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149. Find the probability of throwing at most 2 sixes in 6 throws of a single die.



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150. It is known that 10% of certain articles manufactured are defective . What is the probability that in a random sample of 12 such articles 9 are defective?



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151. In a box containing 100 bulbs 10 are defective the probability that out of a sample of 5 bulbs none is defective is ?

A. 10^{-1}

B. $\left(\frac{1}{2}\right)^5$

C. $\left(\frac{9}{10}\right)^5$

D. 44478

Answer: C



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152. The probability that a student is not a swimmer is $\frac{1}{5}$ then the probability that out of five student , four are swimmer is

A. ${}^5C_4 \left(\frac{4}{5}\right)^4 \left(\frac{1}{5}\right)$

B. $\left(\frac{4}{5}\right)^4 \left(\frac{1}{5}\right)$

C. ${}^5C_2 \left(\frac{4}{5}\right)^4 \left(\frac{1}{5}\right)$

D. None of these

Answer: A



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153. The function $f: N \rightarrow N$ given by $f(x) = 2x$

- A. one-one and onto
- B. one-one but not onto
- C. not one-one and not onto
- D. onto, but not one-one

Answer:



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154. Find $g \circ f(x)$, if $f(x) = 8x^3$ and $g(x) = x^{\frac{1}{3}}$





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155. Let $*$ be an operation such that $a * b = LCM$ of a and b defined on the set $A = \{1, 2, 3, 4, 5\}$. Is $*$ a binary operation? Justify your answer.



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156. If $xy < 1$, $\tan^{-1} x + \tan^{-1} y = \dots\dots\dots$ a)

$$\tan^{-1} \left(\frac{x - y}{1 + xy} \right)$$

$$\text{b) } \tan^{-1} \left(\frac{x+y}{1-xy} \right) \quad \text{c) } \frac{\tan x + \tan y}{1 - \tan x \tan y} \quad \text{d) } \frac{\tan x - \tan y}{1 - \tan x \tan y}$$



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157. Prove that

$$2 \tan^{-1} \left(\frac{1}{2} \right) + \tan^{-1} \left(\frac{1}{7} \right) = \tan^{-1} \left(\frac{31}{17} \right)$$



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158. If $A = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$, then $BA =$

A. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$

C. $\begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$

D. $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

Answer:



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159. Write $A = \begin{bmatrix} 3 & 5 \\ 1 & -1 \end{bmatrix}$ as the sum of a symmetric and a skew symmetric matrix.



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160. Find the inverse of $A = \begin{bmatrix} 2 & -6 \\ 1 & -2 \end{bmatrix}$



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161. The value of $\begin{vmatrix} x & x - 1 \\ x + 1 & x \end{vmatrix}$ is a) 1 b) x c) x^2 d) 0

A. 1

B. x

C. x^2

D. 0

Answer:



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162. Using properties of determinants prove the following.

$$\begin{vmatrix} 1 & x & x^2 \\ x^2 & 1 & x \\ x & x^2 & 1 \end{vmatrix} = (1 - x^3)^2$$



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163. Find all points of discontinuity of f where f is

$$\text{defined by } f(x) = \begin{cases} 2x + 3 & x \leq 2 \\ 2x - 3 & x > 2 \end{cases}$$



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164. If $e^{x-y} = x^y$ then prove that

$$\frac{dy}{dx} = \frac{\log x}{[\log ex]^2}$$



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165. The slope of the tangent to the curve given

$$x = 1 - \cos \theta, y = \theta - \sin \theta \text{ by at } \theta = \frac{\pi}{2}$$

A. 0

B. -1

C. 1

D. Not defined

Answer:



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166. Find the intervals in which the function $f(x) = x^2 - 4x + 6$ is strictly decreasing.



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167. Find the minimum and maximum value, if any, of the function $f(x) = (2x - 1)^2 + 3$



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168. Which of the following function has neither local maxima nor local minima?

a) $f(x) = x^2 + x$ b) $f(x) = \log x$ c)

$f(x) = x^3 - 3x + 3$

d) $f(x) = 3 + |x|$

A. $f(x) = x^2 + x$

B. $f(x) = \log x$

C. $f(x) = x^3 - 3x + 3$

D. $f(x) = 3 + |x|$

Answer:



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169. Find the equation of the tangent to the curve

$$y = 3x^2 \text{ at } (1,1)$$



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170. Use differentiation to approximate $\sqrt{36.6}$.



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171. The angle between the vectors \vec{a} and \vec{b} such that $|\vec{a}| = |\vec{b}| = \sqrt{2}$ and $\vec{a} \cdot \vec{b} = 1$ is

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

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

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

D. 0

Answer:



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172. Find the unit vector along $\vec{a} - \vec{b}$ where $\vec{a} = i + 3j - k$ and $\vec{b} = 3i + 2j + k$.



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173. If the points A and B are (1,2,-1) and (2,1,-1) respectively, then \vec{AB} is

A. $\hat{i} + \hat{j}$

B. $\hat{i} - \hat{j}$

C. $2\hat{i} + \hat{j} - \hat{k}$

D. $\hat{i} + \hat{j} + \hat{k}$

Answer:



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174. Find the value of λ for which the vectors $2i - 4j + 5k$, $i - \lambda j + k$ and $3i + 2j - 5k$ are coplanar.



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175. Find the angle between the vectors $\vec{a} = \hat{i} + \hat{j} - \hat{k}$ and $\vec{b} = \hat{i} - \hat{j} + \hat{k}$



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176. Prove that $\int \cos^2 x dx = \frac{x}{2} + \frac{\sin 2x}{4} + c$

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177. Find $\int \frac{1}{\sqrt{2x - x^2}} dx$

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178. Find $\int x \cos x dx$

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179. Evaluate $\int_0^{\pi} \log(1 + \cos x) dx$



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180. Find $\int_0^5 (x + 1) dx$ as limit of a sum.



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181. The area bounded by the curve above the x-axis, between $x = a$ and $x = b$ is

A. $\int_{f(a)}^b y dy$

B. $\int_a^b x dx$

C. $\int_a^b x dy$

D. $\int_a^b y dx$

Answer:



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182. Find the area of the circle

$$x^2 + y^2 = 4$$

using integration

183. $y = a \cos x + b \sin x$ is the solution of the differential equation

$$\frac{d^2y}{dx^2} + y = 0$$

A. $\frac{d^2y}{dx^2} + y = 0$

B. $\frac{d^2y}{dx^2} - y = 0$

C. $\frac{dy}{dx} + y = 0$

D. $\frac{dy}{dx} + x \frac{dy}{dx} = 0$

Answer:



184. Find the solution of the differential

equation $x \frac{dy}{dx} + 2y = x^2, (x \neq 0)$ given

that $y = 0$ when $x = 1$



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185. Find the shortest distance between the lines

$$\bar{r} = (2i - j - k) + \lambda(3i - 5j + 2k) \quad \text{and}$$

$$\bar{r} = (i + 2j + k) + \mu(i - j + k)$$



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186. Equation of the plane with intercepts 2,3,4 on the x,y,z axis respectively is

A. $2x+3y+4z=1$

B. $2x+3y+4z=12$

C. $6x+4y+3z=1$

D. $6x+4y+3z=12$

Answer:



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187. Find the Cartesian equation of the plane passing through the point $A(2,5,-3)$, $B(-2,-3,5)$ and $C(5,3,-3)$.



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188. Consider the LPP

$$\text{Maximise } z = 3x + 2y$$

Subject to the constraints

$$x + 2y \leq 10, 3x + y \leq 15, x, y \geq 0$$

Find the corner points of the feasible region.



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189. Consider the LPP

$$\text{Maximise } z = 3x + 2y$$

Subject to the constraints

$$x + 2y \leq 10, 3x + y \leq 15, x, y \geq 0$$

Find the maximum value of Z.



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190. 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:



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191. 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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192. 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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193. 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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194. If a matrix has 8 elements, then the order of the matrix can be

A. 2×6

B. 3×5

C. 4×2

D. 4×3

Answer:



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195. Construct a 2×2 matrix whose elements are

given by $a_{ij} = 2i + 3\frac{j}{4}$



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196. If $\begin{bmatrix} 1 & 0 & 0 \\ 2 & 0 & 1 \\ 1 & 0 & 2 \end{bmatrix} \begin{bmatrix} 0 \\ 2 \\ x \end{bmatrix} = 0$ find the value of x .



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197. If $y = e^{\log x}$, then dy/dx is a) $e^{\log x}$ b) $\log x$ c) $1/x$
d) 1

A. $e^{\log x}$

B. $\log x$

C. $1/x$

D. 1

Answer:



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198. Find (dy/dx) if $x =$

$$k(\theta - \sin \theta), y = k(1 + \cos \theta)$$



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199. Find the second derivative of $y = x \tan^{-1} x$



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200. Consider the vectors $\vec{a} = \hat{i} + 2\hat{j} - 3\hat{k}$ and

$$\vec{b} = 4\hat{i} - \hat{j} - 2\hat{k}.$$

Find $|\vec{a}|$ and $|\vec{b}|$



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201. Consider the vectors $\vec{a} = \hat{i} + 2\hat{j} - 3\hat{k}$ and $\vec{b} = 4\hat{i} - \hat{j} - 2\hat{k}$.

Find $\vec{a} \cdot \vec{b}$



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202. Consider the vectors $\vec{a} = \hat{i} + 2\hat{j} - 3\hat{k}$ and $\vec{b} = 4\hat{i} - \hat{j} - 2\hat{k}$.

Find the projections of \vec{a} on \vec{b} and \vec{b} on \vec{a} .



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203. Write the scalar components of

$$3\hat{i} - 2\hat{j} + 5\hat{k}$$



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204. Find the angle between the vectors $\hat{i} + \hat{j}$

and $\hat{i} - \hat{j}$.



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205. Find $|\vec{x}|$, if for a unit vector \vec{a} , $(\vec{x} - \vec{a}) \cdot (\vec{x} + \vec{a}) = 12$



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206. If $\begin{vmatrix} x & 2 \\ 18 & x \end{vmatrix} = \begin{vmatrix} 6 & 2 \\ 18 & 6 \end{vmatrix}$, then $x =$

A. ± 6

B. ± 7

C. ± 5

D. ± 4

Answer:



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207. prove $\begin{vmatrix} 1 & bc & a(b+c) \\ 1 & ca & b(c+a) \\ 1 & ab & c(a+b) \end{vmatrix} = 0$



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208. Principal value of $\tan^{-1} \sqrt{3}$ is -----



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209. Write the following functions in the simplest

form :

$$\tan^{-1} \sqrt{\frac{1 - \cos x}{1 + \cos x}}, 0 < x < \pi$$



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210. Find $\int \frac{x^2}{2x^3 + 1} dx = \text{-----}$



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211. Prove that the function $f(x)=2x-5$ is continuous

at $x=-2$



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212. If $x\sqrt{1+y} = \sqrt{x}$, prove that $dy/dx = -\frac{1}{x^2}$



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213. The factor of 3 is

A. 1

B. -2

C. 4

D. 3

Answer:



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214. Solve: $x-y+2z=7$

$$3x+4y-5z=-5$$

$$2x-y+3z=12$$



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215. On Z^+ , $a \cdot b = 2^{\sqrt{ab}}$, value of $4 \cdot 9$ is-----

A. 2^{36}

B. 2^6

C. 2^{13}

D. 1

Answer:



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216. In each of the following cases, states whether the function is one-one, onto or bijective. Justify your answer. $f: \mathbb{R} \rightarrow \mathbb{R}$ defined by $f(x) = 3 - 4x$



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217. If $f(x)=2x+3$, find $f[f(x)]$.



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218. The total revenue received from the sale of x units of a product is $R(x)=6x^2 + 180$. The marginal revenue when $x=10$ is

A. 180

B. 120

C. 360

D. 60

Answer:



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219. Find the equation of the normal to the curve $x^2=9y$ which passes through the point (6,4).



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220. Consider the lines

$$l_1: \frac{x-1}{2} = \frac{y-1}{-1} = \frac{z}{1}$$

$$l_2: \frac{x - 2}{3} = \frac{y - 1}{-5} = \frac{z + 1}{1}$$

Find Direction ratios of the line l_1



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221. Consider the lines

$$l_1: \frac{x - 1}{2} = \frac{y - 1}{-1} = \frac{z}{1}$$

$$l_2: \frac{x - 2}{3} = \frac{y - 1}{-5} = \frac{z + 1}{1}$$

Find The shortest distance between the lines l_1
and l_2



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222. The condition for the lines with direction ratio a_1, b_1, c_1 and a_2, b_2, c_2 are perpendicular is -

A. $a_1a_2 + b_1b_2 + c_1c_2=0$

B. $a_1a_2 + a_2b_1 + c_1c_2=0$

C. $a_1 = a_2, b_1 = b_2, c_1 = c_2$

D. $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

Answer:



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223. Find the angle between the lines

$$\frac{x + 3}{3} = \frac{y - 1}{5} = \frac{z + 3}{4} \text{ and}$$
$$\frac{x + 1}{1} = \frac{y - 4}{1} = \frac{z - 5}{2} .$$



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224. Consider the differential equation

$$dy/(dx)+y=\cos(e^x)$$

Write the order and degree of the differential equation



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225. Consider the differential equation

$$dy/dx + y = \cos(e^x)$$

. Solve the differential equation.



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226. Consider the differential equation $dy/dx = 4xy$.

Write the order and degree of the differential equation.



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227. Consider the differential equation $\frac{dy}{dx}=4xy$.

Solve the differential equation given $y(0)=1$.



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228. Consider the curve

$$\frac{x^2}{16} + \frac{y^2}{9} = 1$$

Find the points of intersection of the curve with x-axis.



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229. Find the area of the region bounded by the

ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$.



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230. The probability that Satish solves a problem is $1/2$ and probability that Gayathri solves the problem is $1/3$. If both try to solve the problem independently, find the probability that, Satish will not solve the problem.



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231. A and B try to solve a problem independently.

The probability that A solves the problem is $\frac{1}{2}$

and that of B solves the problem is $\frac{1}{3}$. Find the

probability that the problem is solved.



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232. 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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233. Consider the LPP

$$\text{Maximise } z = 3x + 2y$$

Subject to the constraints

$$x + 2y \leq 10, 3x + y \leq 15, x, y \geq 0$$

Find the maximum value of Z.



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234. A bakery owner makes two types of cakes A and B. Three machines are needed for this purpose. The time (in minutes) required for

making each type of cake in each of the machines is given below:

Machine	Types of cakes	
	A	B
I	12	6
II	18	0
III	6	9

Each machine is available for atmost 6 hours per day. Assume that all cakes will be sold out every day. The bakery owner wants to make maximum profit per day by making 7.50 from type A and 5 from type B.

write the object function



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235. A bakery owner makes two types of cakes A and B. Three machines are needed for this purpose. The time (in minutes) required for making each type of cake in each of the machines is given below:

Machine	Types of cakes	
	A	B
I	12	6
II	18	0
III	6	9

Each machine is available for at most 6 hours per day. Assume that all cakes will be sold out every day. The bakery owner wants to make maximum

profit per day by making 7.50 from type A and 5 from type B.

Write the constraints



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236. 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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237. Let R be relation defined on $A = \{1, 2, 3\}$ by $R = \{(1, 3), (3, 1), (2, 2)\}$ is

- A. Reflexive
- B. Symmetric
- C. Transitive
- D. Reflexive but not transitive

Answer:



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238. Find fog and gof if $f(x) = |x| + 1$ and $g(x) = 2x - 1$

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239. Let $*$ be a binary operation defined on $N \times N$ by $(a, b) * (c, d) = (a + c, b + d)$

Find the identity element for $*$ if it exists.

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240. Principal value of $\cot^{-1}\left(-\frac{1}{\sqrt{3}}\right)$ is a) $\frac{\pi}{3}$ b) $-\frac{\pi}{3}$ c) $\frac{\pi}{6}$ d) $2\frac{\pi}{3}$

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

B. $\frac{\pi}{-3}$

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

D. $2\frac{\pi}{3}$

Answer:



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241. If $\tan^{-1}\left(\frac{x-1}{x-2}\right) + \tan^{-1}\left(\frac{x+1}{x+2}\right) = \frac{\pi}{4}$.

then find the value of x.



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242. The value of k such that matrix $\begin{bmatrix} 1 & k \\ -k & 1 \end{bmatrix}$ is symmetric if

A. 0

B. 1

C. -1

D. 2

Answer:



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243. If $A = \begin{bmatrix} \cos \theta & \sin \theta \\ -\sin \theta & \cos \theta \end{bmatrix}$ then prove that

$$A^2 = \begin{bmatrix} \cos 2\theta & \sin 2\theta \\ -\sin 2\theta & \cos 2\theta \end{bmatrix}$$



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244. If $A = \begin{bmatrix} 1 & 3 \\ 4 & 1 \end{bmatrix}$, then find $|3A^T|$



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245. If $A = \begin{bmatrix} a & 1 \\ 1 & 0 \end{bmatrix}$ is such that $A^2 = I$ then a equals

A. 1

B. -1

C. 0

D. 2

Answer:



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246. Solve the system of equations

$$x - y + z = 4, 2x + y - 3z = 0, x + y + z = 2$$

Using matrix method



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247. Find the values of a and b such that the function

$$f(x) = \begin{cases} 5a & x \leq 0 \\ a \sin x + \cos x & 0 < x < \frac{\pi}{2} \\ b - \frac{\pi}{2} & x \geq \frac{\pi}{2} \end{cases} \text{ is continuous}$$



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248. Find dy/dx if $(\sin x)^{\cos y} = (\cos y)^{\sin x}$



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249. The slope of the normal to the curve,

$$y^2 = 4x \text{ at } (1,2) \text{ is}$$

A. 1

B. 44228

C. 2

D. -1

Answer:



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250. Find the intervals in which the function

$2x^3 + 9x^2 + 12x - 1$ is strictly increasing.



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251. The rate of change of volume of a sphere with

respect to its radius when

radius is 1 unit.

A. 4π

B. 2π

C. π

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

Answer:



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252. Find two positive numbers whose sum is 16 and the sum of whose Cubes is minimum.



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253. Find the following: $\int \frac{1}{x(x^7 + 1)} dx$



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254. Find the following: $\int_1^4 |x - 2| dx$

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255. Find $\int_0^{\frac{\pi}{2}} \log \sin x dx$

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256. Evaluate $\int_0^4 x^2 dx$ as the limit of a sum.

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257. Area bounded by the curves $y = \cos x$, $x = \frac{\pi}{2}$,

$x=0$, $y=0$ is

A. 44228

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

C. 1

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

Answer:



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258. Find the area of the region bounded by the

$$y^2 = 4ax \text{ and } x^2 = 4ay, a > 0$$



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259. The order of the differential equation

$$x^2 \frac{d^2y}{dx^2} = 1 + \left(\frac{dy}{dx} \right)^3 \text{ is}$$

A. 1

B. 3

C. 4

D. 2

Answer:



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260. Find the particular solution of the differential equation

$$(1 + x^2) \frac{dy}{dx} + 2xy = \frac{1}{1 + x^2}, \text{when } y = 0,$$

$$x = 1.$$



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261. The projection of the vector $2i + 3j + 2k$ on the vector $i + j + k$ is a) $\frac{3}{\sqrt{3}}$ b) $\frac{7}{\sqrt{3}}$ c) $\frac{3}{\sqrt{17}}$ d)

$$\frac{7}{\sqrt{17}}$$

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

B. $\frac{7}{\sqrt{3}}$

C. $\frac{3}{\sqrt{17}}$

D. $\frac{7}{\sqrt{17}}$

Answer:



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262. Find the area of a parallelogram whose adjacent sides are the vector $2i + j + k$ and $i - j$.



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263. The angle between the vectors $i + j$ and $j + k$ is

A. 60°

B. 30°

C. 45°

D. 90°

Answer:



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264. If \vec{a} , \vec{b} , \vec{c} are unit vectors such that

$\vec{a} + \vec{b} + \vec{c} = 0$, find the value of

$\vec{a} \cdot \vec{b} + \vec{b} \cdot \vec{c} + \vec{c} \cdot \vec{a}$.



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265. The lines $x-1=y=z$ is perpendicular to the

line.....a) $\frac{x-2}{1} = \frac{y-1}{2} = \frac{z}{-3}$ b)

$x-2 = y-2 = z$ c) $\frac{x-2}{1} = \frac{y-1}{2} = \frac{z}{3}$

d) $x=y=z/2$

A. $\frac{x-2}{1} = \frac{y-1}{2} = \frac{z}{-3}$

B. $x-2=y-2=z$

C. $\frac{x-2}{1} = \frac{y-1}{2} = \frac{z}{3}$

D. $x=y=z/2$

Answer:



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266. Find the shortest distance between the lines

$$\bar{r} = i + 2j + 3k + \lambda(i + j + k) \text{ and}$$

$$\bar{r} = i + j + k + \mu(i + j + k)$$



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267. Distance of the point(0,0,1) from the plane

$$x + y + z = 3 \text{ a) } \frac{1}{\sqrt{3}} \text{ units b) } \frac{2}{\sqrt{3}} \text{ units c) } \sqrt{3} \text{ units}$$

$$\text{d) } \frac{\sqrt{3}}{2} \text{ units}$$

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

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

C. $\sqrt{3}$

D. $\frac{\sqrt{3}}{2}$

Answer:



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268. Find the equation of the plane through the line of intersection of the planes $x+y+z=1$ and $2x+3y+4z=5$ which is perpendicular to $x-y+z=0$



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269. Consider the linear programming problem:

$$\text{Maximum } z = 50x + 40y$$

subject to constraints:

$$x + 2y \leq 10, 3x + 4y \geq 24, x, y \geq 0$$

Find the maximum value of z .



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270. Consider the linear programming problem:

$$\text{Maximize } Z = 50x + 40y$$

Subject to the constraints

$$x + 2y \geq 10$$

$$3x + 4y \leq 24$$

$$x \geq 0, y \geq 0$$

Find the corner points of the feasible region.



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271. Consider the linear programming problem:

$$\text{Maximize } Z=50x+40y$$

Subject to the constraints

$$x + 2y \geq 10$$

$$3x + 4y \leq 24$$

$$x \geq 0, y \geq 0$$

Find the maximum value of Z .



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

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

B. $(P(B))/(P(A))$

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

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

Answer:



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273. 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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274. 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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275. 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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276. 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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277. If A is a 2×2 matrix and $|A| = 1$, then $|2A|$

is _____

A. 1

B. 2

C. 3

D. 4

Answer:



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278. Let $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$

find A^{-1}



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279. $\sin^{-1} \left[\sin \left(\frac{7\pi}{6} \right) \right]$ is equal to --

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

B. $\frac{5\pi}{6}$

C. $\frac{3\pi}{6}$

D. $\frac{7\pi}{6}$

Answer:



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280. Using the above result prove that

$$\tan^{-1}\left(\frac{1}{2}\right) + \tan^{-1}\left(\frac{1}{3}\right) = \frac{\pi}{4}$$



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281. If $A^T = \begin{bmatrix} -2 & 3 \\ 1 & 2 \end{bmatrix}$ and $B^T = \begin{bmatrix} -1 & 0 \\ 1 & 2 \end{bmatrix}$ then

find $(A + 2B)^T$



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282. If A and B are symmetric matrices of the same order, then prove that $(A+B)$ is also symmetric.



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283. Express $A = \begin{bmatrix} 1 & 7 \\ 2 & 9 \end{bmatrix}$ as a sum of a symmetric and skew-symmetric matrices.



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284. The derivative of $2^{\sin x}$ is _____



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285. Find $\frac{dy}{dx}$ if $x^y = y^x$



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286. If $y = ae^{5x} + be^{-5x}$, show that

$$\frac{d^2y}{dx^2} - 25y = 0$$



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287. $\int \frac{1}{\cos^2 x} dx = \text{-----}$

a) $\sec^2 x + C$

b) $\tan^2 x + C$

c) $\sec x + C$

d) $\tan x + C$

A. $\sec^2 x + C$

B. $\tan^2 x + C$

C. $\sec x + C$

D. $\tan x + C$

Answer:



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288. Find $\int x \tan^{-1} x dx$.



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289. Consider the vectors $\vec{a} = \hat{i} - \hat{j} + 3\hat{k}$ and

$$\vec{b} = 3\hat{i} - 7\hat{j} + \hat{k}$$

Write $\frac{\vec{a} + \vec{b}}{2}$



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290. Consider the vectors $\vec{a} = \hat{i} - \hat{j} + 3\hat{k}$ and

$$\vec{b} = 3\hat{i} - 7\hat{j} + \hat{k}$$

Find the unit vector in the direction of $\frac{\vec{a} + \vec{b}}{2}$



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291. Consider the vectors $\vec{a} = \hat{i} - \hat{j} + 3\hat{k}$ and $\vec{b} = 3\hat{i} - 7\hat{j} + \hat{k}$ Find the area of the parallelogram with adjacent sides \vec{a} and \vec{b} .



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292. Consider the vectors $\vec{a} = 2\hat{i} - 3\hat{j} + \hat{k}$

Find $|\vec{a}|$



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293. Consider the vectors $\vec{a} = 2\hat{i} - 3\hat{j} + \hat{k}$

Find λ if \vec{a} is perpendicular to $\hat{i} + 3\hat{j} + \lambda\hat{k}$.



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294. Consider the vectors $\vec{a} = 2\hat{i} - 3\hat{j} + \hat{k}$. Find

a vector

parallel to \vec{a} having magnitudes 7 units.



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295. Find the relationship between p and q so that the function

$$f(x) = \begin{cases} px + 5 & \text{if } x \leq 5 \\ qx + 2 & \text{if } x > 5 \end{cases} \text{ is continuous}$$

at $x=5$



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296. Find $\frac{dy}{dx}$ of the following

$$y = \sec^{-1} \left(\frac{1}{2x^2 - 1} \right)$$



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297. If $f: R \rightarrow R$, $f(x)=x+3$. Then find $f \circ f(1)$

A. 1

B. 3

C. 6

D. 7

Answer:



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298. Consider $f: \mathbb{R} \rightarrow \mathbb{R}$, $f(x)=4x+5$.

Show that f is invertible.



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299. Consider $f: \mathbb{R} \rightarrow \mathbb{R}$, $f(x)=4x+5$.

Show that f is invertible.



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300. The order of the differential equation

$$\left(\frac{x}{y}\right) \frac{d^2y}{dx^2} + \left(\frac{x \frac{dy}{dx} - y}{x^2}\right) \frac{dy}{dx} = 0 \text{ is } \underline{\hspace{2cm}}$$



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301. Solve : $\frac{dy}{dx} = \frac{x^2 + y^2}{2xy}$



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302. Slope of the tangent to the curve

$y = 3x^2 + 2 \sin x$ at $x=0$ is

A. 3

B. 6

C. 2

D. 5

Answer:



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303. The volume of a cube is increasing at the rate of $5\text{cm}^3/\text{s}$. How fast is

the surface area increasing when the length of an edge is 5sm?



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304. Consider the parabolas $y = x^2$ and $y^2 = x$.

Draw a rough sketch and shade the region bounded by these parabolas.



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305. Consider the parabolas $y = x^2$ and $y^2 = x$.

Find the area of the region bounded by the two

parabolas.



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306. A random variable X has the following probability distribution:

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

Find the value of k .



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307. A random variable X has the following probability distribution:

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

Find $P(X > 3)$.



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308. A random variable X has the following probability distribution:

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

Find $P(2 \leq X \leq 4)$.



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



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310. 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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311. Evaluate the determinant of $A = \begin{bmatrix} 1 & 7 & 5 \\ 0 & 3 & 2 \\ 0 & 9 & 7 \end{bmatrix}$

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312. By using properties of determinants, prove that

$$\begin{vmatrix} x + 4 & 2x & 2x \\ 2x & x + 4 & 2x \\ 2x & 2x & x + 4 \end{vmatrix} = (5x + 4)(4 - x)^2$$

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313. Solve the LPP:

Maximize $Z = -3x + 4y$

Subject to

$$x + 2y \leq 8,$$

$$3x + 2y \leq 12,$$

$$x \geq 0, y \geq 0.$$



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314. Consider the points $A(2,3,1)$ and $B(3,-4,5)$.

Write the direction

ratios of the line passing through A and B.



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315. Consider the points $A(2,3,1)$ and $B(3,-4,5)$. Find the vector and Cartesian equations of the line through A and B .



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316. Determine the direction cosines of the normal to the plane and the distance from the

origin

$$x + y + z = 1.$$



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317. Find the distance of the point $(2,5,-3)$ from the plane $x+y+z=1$.



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318. Tailor Raju is available on daily wages rs 600 per day and Somu on rs 620 per day. Raju can stitch 6 shirts and 5 pants per day while Somu can

stitch 10 shirts and 3 pants per day. In order to stitch 60 shirts and 40 pants in the minimum cost of production, how many days each Raju and Somu should work? What should be the minimum cost of production?



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