MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

PROBABILITY

Practice Exercise Exercies 1 Topical Problems

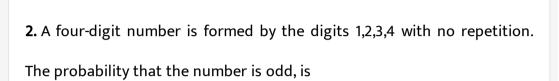**1.** 5 persons A, B, C, D and E are in a queue of a shop. The probability that A and E always occur together, is

A. $\dfrac{1}{4}$

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

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

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

Answer: C

2. A four-digit number is formed by the digits 1,2,3,4 with no repetition.

The probability that the number is odd, is

A. zero

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

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

D. None of these

Answer: D

3. If the integers m and n are chosen at random between 1 and 100, then

the probability that a number of the form $7^m + 7^n$ is divisible by 5, equals

(a) $\dfrac{1}{4}$ (b) $\dfrac{1}{7}$ (c) $\dfrac{1}{8}$ (d) $\dfrac{1}{49}$

A. $\dfrac{1}{4}$

B. $\dfrac{1}{2}$

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

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

Answer: A

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4. 36. One mapping /function is selected at random from all the mappings of the set A = {1,2,3,4,5). Into itself. Find the probability that the mapping selected is one to one.

A. $\dfrac{n!}{n^{n-1}}$

B. $\dfrac{n!}{n^n}$

C. $\dfrac{n!}{2n^n}$

D. None of these

Answer: B

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5. Ram is visiting a friend. Ram knows that his friend has 2 children and 1 of them is a boy. Assuming that a child is equally likely to be a boy or a girl, then the probality that the other child is a girl is

A. $1/2$

B. $1/3$

C. $2/3$

D. $7/10$

Answer: C

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6. What is the probability that a leap year selected at random contains 53 Sundays is

A. $\dfrac{7}{366}$

B. $\dfrac{28}{183}$

C. $\dfrac{1}{7}$

D. $\dfrac{2}{7}$

Answer: D

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7. Three of the six vertices of a regular hexagon are chosen the random. What is the probability that the triangle with these vertices is equilateral.

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

B. $\dfrac{1}{5}$

C. $\dfrac{1}{10}$

D. $\dfrac{1}{20}$

Answer: C

8. A six-faced unbiased die is thrown twice and the sum of the numbers appearing on the upper face is observed to be 7. The probability that the number 3 has appeared atleast once, is

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

B. $\dfrac{1}{2}$

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

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

Answer: C

9. If n integers taken art random are multiplied together , then the probability that eh last digit of the product is 1, 3, 7, or 9 is $2^n / 5^n$ b. $4^n - 2^n / 5^n$ c. $4^n / 5^n$ d. none of these

A. $\dfrac{2^n}{5^n}$

B. $\dfrac{4^n - 2^n}{5^n}$

C. $\dfrac{4^n}{5^n}$

D. None of these

Answer: A

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10. four fair dice D_1, D_2, D_3 and D_4 each having six faces numbered 1,2,3,4,5 and 6 are rolled simultaneously. The probability that D_4 shows a number appearing on one of D_1, D_2, D_3 is

A. $\dfrac{91}{216}$

B. $\dfrac{108}{216}$

C. $\dfrac{125}{216}$

D. $\dfrac{127}{216}$

Answer: A

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11. An urn contains 8 red and 5 white balls. Three balls are drawn at random. Then, the probability that balls of both colours are drawn, is

A. $\dfrac{40}{143}$

B. $\dfrac{70}{143}$

C. $\dfrac{3}{13}$

D. $\dfrac{10}{13}$

Answer: D

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12. 4 boys and 2 girls occupy seats in a row at random. Then, the probability that two girls occupy seats side by side is

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

B. $\dfrac{1}{4}$

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

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

Answer: C

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13. A card is drawn from a well shuffled pack of playing cards. The probability that it is a king of a heart, is

A. $\dfrac{1}{52}$

B. $\dfrac{15}{52}$

C. $\dfrac{18}{52}$

D. $\dfrac{19}{52}$

Answer: A

14. A fair coin is tossed 100 times. The probability of getting tails an odd number of times is $1/2$ b. $1/8$ c. $3/8$ d. none of these

A. $1/2$

B. $1/4$

C. 0

D. 1

Answer: A

15. An urn contains nine balls of which three are red, four are blue and two are green. Three balls are drawn at random without replacement from the urn. The probability that the three balls have different colour is

(1) $\dfrac{2}{7}$ (2) $\dfrac{1}{21}$ (3) $\dfrac{2}{23}$ (4) $\dfrac{1}{3}$

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

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

C. $\dfrac{1}{21}$

D. $\dfrac{2}{23}$

Answer: B

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16. Out of 3n consecutive natural numbers, 3 natural numbers are chosen at random without replacement. The probability that the sum of the chosen numbers is divisible by 3, is

A. $\dfrac{n(3n^2 - 3n + 2)}{2}$

B. $\dfrac{(3n^2 - 3n + 2)}{2(3n - 1)(3n - 2)}$

C. $\dfrac{(3n^2 - 3n + 2)}{(3n - 1)(3n - 2)}$

D. $\dfrac{n(3n - 1)(3n - 2)}{3(n - 1)}$

Answer: C

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17. From a group of 8 boys and 3 girls, a committee of 5 members to be formed. Find the probability that 2 particular girls are included in the committee.

A. $\dfrac{4}{11}$

B. $\dfrac{2}{11}$

C. $\dfrac{6}{11}$

D. $\dfrac{8}{11}$

Answer: B

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18. The probability that the three cards drawn from a pack of 52 cards, are all black, is

A. $\dfrac{1}{17}$

B. $\dfrac{2}{17}$

C. $\dfrac{3}{17}$

D. $\dfrac{2}{17}$

Answer: B

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19. In an assembly of 4 persons the probability that atleast 2 of them have the same birthday, is

A. 0.293

B. 0.24

C. 0.0001

D. 0.016

Answer: D

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20. Probability of all 3-digit numbers having all the digits same is

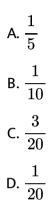A. $\dfrac{1}{100}$

B. $\dfrac{3}{100}$

C. $\dfrac{7}{100}$

D. None of these

Answer: A

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21. Probability of getting positive integral roots of the equation $x^2 - n = 0$ for the integer n, $1 \leq n \leq 40$ is

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

B. $\dfrac{1}{10}$

C. $\dfrac{3}{20}$

D. $\dfrac{1}{20}$

Answer: C

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22. A purse contains 4 copper and 3 silver coins. Another purse contains 6 copper and 2 silver coins. A coin is taken out from any purse, the probability that it is a silver coin, is

A. $\dfrac{37}{56}$

B. $\dfrac{19}{56}$

C. $\dfrac{4}{7}$

D. $\dfrac{2}{3}$

Answer: B

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23. A committee of five is to be chosen from a group of 9 people. The probability that a certain married couple will either serve together or not at all is

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

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

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

D. $\dfrac{2}{3}$

Answer: C

24. A letter is taken out at random from 'ASSISTANT and another is taken out from 'STATISTICS. The probability that they are the same letters, is

A. $\dfrac{1}{45}$

B. $\dfrac{13}{90}$

C. $\dfrac{19}{90}$

D. None of these

Answer: C

25. Let S be the sample space of the random experiment of throwing simultaneously two unbiased dice with six faces (numbered 1 to 6) and let

$E_k = \{(a, b) \in S : ab = k\}$ for $k \geq 1$ If $p_k = p(E_k)$ for $k \geq 1$ then correct among the following, is (Eamcet 2008)

A. $p_1 < p_{30} < p_4 < p_6$

B. $p_{36} < p_6 < p_2 < p_4$

C. $p_1 < p_{11} < p_4 < p_6$

D. $p_{36} < p_{11} < p_6 < p_4$

Answer: A

26. Let A and B be two events such that $p(\overline{A} \cup B) = \dfrac{1}{6}, p(A \cap B) = \dfrac{1}{4}$ and $p(\overline{A}) = \dfrac{1}{4}$, where $\overline{A}$ stands for the complement of the event A. Then the events A and B are (1) mutually exclusive and independent (2) equally likely but not independent (3) independent but not equally likely (4) independent and equally likely

A. mutually exclusive and independent

B. independent but not equally likely

C. equally likely but not independent

D. equally likely and mutually exclusive
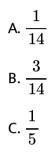
Answer: B

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27. The probability of simultaneous occurrence of at least one of two events A and B is p. If the probability that exactly one of A, B occurs is q then prove that $P(A) + P(B) = 2 - 2p + q$.

A. $2 - 2p + q$

B. $2 + 2p - q$

C. $3 - 3p + q$

D. $2 - 4p + q$

Answer: A

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28. One ticket is selected at random from 50 tickets numbered 00, 01, 02, ... , 49. Then the probability that the sum of the digits on the selected ticket is 8, given that the product of these digits is zero, equals (1) 1/14 (2) 1/7 (3) 5/14 (4) 1/50

A. $\dfrac{1}{14}$

B. $\dfrac{3}{14}$

C. $\dfrac{1}{5}$

D. None of these

Answer: C

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29. A student answers a multiple choice question with 5 alternatives, of which exactly one is correct. The probability that he knows the correct answer is $p, 0 < p < 1$. If he does not know the correct answer, he randomly ticks one answer. Given that he has answered the question correctly, the probability that he did not tick the answer randomly, is

A. $\dfrac{3p}{4p+3}$

B. $\dfrac{5p}{3p+2}$

C. $\dfrac{5p}{4p+1}$

D. $\dfrac{4p}{3p+1}$

Answer: C

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30. If A,B and C are mutually exclusive and exhaustive events of a random experiment such that $P(B) = \dfrac{3}{2}P(A)$ and $P(C) = \dfrac{1}{2}P(B)$, then $P(A \cup C)$ equals

A. $\dfrac{10}{13}$

B. $\dfrac{3}{13}$

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

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

Answer: D

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31. The probability of India winning a test match against West Indies is 1/2. Assuming independence from match to match, find the probability that in a match series Indias second win occurs at the third test.

A. $1/8$

B. $1/2$

C. $1/4$

D. $2/3$

Answer: C

32. Of the three independent event E_1, E_2 and E_3, the probability that only E_1 occurs is α, only E_2 occurs is β and only E_3 occurs is γ. If the probavvility p that none of events E_1, E_2 or E_3 occurs satisfy the equations $(\alpha - 2\beta)p = \alpha\beta$ and $(\beta - 3\gamma)p = 2\beta\gamma$. All the given probabilities are assumed to lie in the interval (0, 1). Then,

$$\dfrac{\text{probability of occurrence of } E_1}{\text{probability of occurrence of } E_3} \text{ is equal to}$$

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

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

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

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

Answer: A

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33. If A and B are two Mutually Exclusive events in a sample space S such that $P(B) = 2P(A)$ and $A \cup B = S$, then $P(A) =$

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

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

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

D. $\dfrac{3}{4}$

Answer: B

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34. Two dice are tossed once. Find the probability of getting an even number on the first die or a total of 8.

A. $\dfrac{1}{36}$

B. $\dfrac{3}{36}$

C. $\dfrac{11}{36}$

D. $\dfrac{5}{9}$

Answer: D

35. Let A, B, C be three events such that $P(A) = 0.3, P(B) = 0.4, P(C) = 0.8, P(A \cap B) = 0.88, P(A \cap C) = 0$

If $P(A \cup B \cup C) \geq 0.75$, then show that $0.23 \leq P(B \cap C) \leq 0.48$.

A. $P(B \cap C) \leq 0.23$

B. $P(B \cap C) \leq 0.48$

C. $0.23 \leq P(B \cap C) \leq 0.48$

D. $0.23 \leq P(B \cap C) \geq 0.48$

Answer: C

36. एक व्यक्ति के बारे में ज्ञात है कि वह 4 में से 3 बार सत्य बोलता है। वह एक पासे को उछालता है और बतलाता है कि उस पर आने वाली संख्या 6 है। इस की प्रायिकता ज्ञात कीजिए कि पासे आने वाली संख्या वास्तव में 6 है।

A. $\dfrac{3}{8}$

B. $\dfrac{1}{5}$

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

D. None of these

Answer: A

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37. If A and B are independent events of a random experiment such that $P(A \cap B) = \dfrac{1}{6}$ and $P(\overline{A} \cap \overline{B}) = \dfrac{1}{3}$ then $P(A) =$

A. $\dfrac{1}{4}$

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

C. $\dfrac{5}{7}$

D. $\dfrac{2}{3}$

Answer: B

38. The probability that a leap year selected at random will contain either

53 Thursday or 53 Friday is

A. $\dfrac{3}{7}$

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

C. $\dfrac{5}{7}$

D. $\dfrac{1}{7}$

Answer: A

39. The chances to fail in Physis are 20% and the chances to fail in

Mathematics are 10%. What are the chances to fail in atleast one subject

?

A. 28 %

B. 38 %

C. 72 %

D. 82 %

Answer: A

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40. एक परिवार में दो बच्चे हैं। यदि यह ज्ञात हो कि बच्चों में से कम से कम एक बच्चा लड़का है तो दोनों बच्चों के लड़का होने की क्या प्रायिकता है?

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

B. $\dfrac{1}{4}$

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

D. None of these

Answer: C

41. The probability that at least one of the events $A and B$ occurs is 0.6. If $A and B$ occur simultaneously with probability 0.2, then find $P(A) + P(B)$.

    A. 0.4

    B. 0.8

    C. 1.2

    D. 1.4

Answer: C

42. If two events A and B are such that $P(A) > 0$ and $P(B) \neq 1$, then $P\left(\dfrac{\overline{A}}{\overline{B}}\right)$ is equal to

A. $1 - P(A/\bar{B})$

B. $1 - P(\bar{A}/B)$

C. $\dfrac{1 - P(A \cap B)}{P(\bar{B})}$

D. $\dfrac{P(\bar{A})}{P(\bar{B})}$

Answer: A

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43. An anti-aircraft gun can take a maximum of four shots at an enemy plane moving away from it. The probability of hitting the plane at the first, second, third and fourth shots are 0.4, 0.3, 0.2 and 0.1, respectively, What is the probability that the plane is hit when all the four shots are fired? (A) 0.4379 (B) 0.6872 (C) 0.6976 (D) 0.3507

A. 0.6976

B. 0.3024

C. 0.72

D. 0.6431

Answer: A

44. If M and N are any two events, then the probability that exactly one of them occurs is

A. $P(M) + P(N) - 2P(M \cup N)$

B. $P(M) + P(N) - P(M \cup N)$

C. $P(M^c) + P(N^c) - 2P(M^c \cup N^c)$

D. None of the above

Answer: D

45. If $P(B) = \dfrac{3}{4}, P(A \cap B \cap \overline{C}) = \dfrac{1}{3}$ and $P(\overline{A} \cap B\overline{C}) = \dfrac{1}{3}$ then $P(B \cap C) =$

A. $\dfrac{1}{12}$

B. $\dfrac{1}{6}$

C. $\dfrac{1}{15}$

D. $\dfrac{1}{9}$

Answer: A

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46. A bag contains 5 white and 3 black balls. Four balls are successively drawn out without replacement. What is the probability that they are alternately of different colours?

A. $\dfrac{1}{196}$

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

C. $\dfrac{1}{7}$

D. $\dfrac{13}{56}$

Answer: C

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47. If events are independents and $P(A) = \dfrac{1}{3}, P(B) = \dfrac{1}{3}$ and $P(C) = \dfrac{1}{4}$, then $P(A' \cap B' \cap C')$ is equal to

A. $\dfrac{1}{4}$

B. $\dfrac{1}{12}$

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

D. $\dfrac{5}{12}$

Answer: C

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48. Two dice are rolled one after the other.The probability that the number on the first dice is smaller than that of the number on second dice is-

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

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

C. $\dfrac{7}{18}$

D. $\dfrac{5}{12}$

Answer: D

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49. If A, B are two events such that $P(A') = 0.3, P(B) = 0.4$ and $P(A \cap B') = 0.5,$ then $P(A \cup B')$ is equal to

A. 0.5

B. 0.8

C. 1

D. 0.1

50. If E and Fare independent events such that $0 < P(E) < 1$ and $0 < P(F) < 1$, then

A. E and F^c are independent

B. E^c and F^c are independent

C. $P\left(\dfrac{E}{F}\right) + P\left(\dfrac{E^c}{F^c}\right) = 1$

D. All of the above

1. Two dice are thrown simultaneously. the probability of obtaining a total score of 5 is a. 1/18 b. 1/12 c. 1/9 d. none of these

A. $\dfrac{1}{9}$

B. $\dfrac{1}{18}$

C. $\dfrac{1}{36}$

D. $\dfrac{1}{12}$

Answer: A

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2. If two dice are thrown simultaneously, then the probability that the sum of the numbers which come upon the dice to be more than 5 is

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

B. $\dfrac{1}{6}$

C. $\dfrac{13}{18}$

D. $\dfrac{7}{18}$

Answer: C

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3. A fair six-faced die is rolled 12 times. The probability that each face turns up twice is equal to

A. $\dfrac{12!}{6!6!6^{12}}$

B. $\dfrac{2^{12}}{2^6 6^{12}}$

C. $\dfrac{12!}{2^6 6^{12}}$

D. $\dfrac{12!}{6^2 6^{12}}$

Answer: C

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4. If a single letter is selected at random from the word 'PROBABILITY', then the probability that it is a vowel is

A. $\dfrac{8}{11}$

B. $\dfrac{4}{11}$

C. $\dfrac{2}{11}$

D. $\dfrac{3}{11}$

Answer: B

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5. If three square are chosen at random on a chess Board, show that chance that they should be in a diagonal line 7/744.

A. $\dfrac{7}{744}$

B. $\dfrac{5}{744}$

C. $\dfrac{7}{544}$

D. $\dfrac{11}{744}$

Answer: A

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6. If two cards are drawn simultaneously from the same set, then probability that atleast one of them will be the ace of hearts is

A. $\dfrac{1}{13}$

B. $\dfrac{1}{26}$

C. $\dfrac{1}{52}$

D. $\dfrac{3}{13}$

Answer: B

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7. Two decks of playing cards are well shuffled and 26 cards are randomly distributed to a player. Then, the probability that the player gets all distinct cards is

A. $.^{52}C_{26}/.^{104}C_{26}$

B. $2 \times .^{52}C_{26}/.^{104}C_{26}$

C. $2^{13} \times .^{52}C_{26}/.^{104}C_{26}$

D. $2^{26} \times .^{52}C_{26}/.^{104}C_{26}$

Answer: D

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8. Two dice are rolled together. Find the probability of getting such numbers on two dice whose product is a perfect square.

A. $2/9$

B. $1/9$

C. $\dfrac{5}{18}$

D. None of these

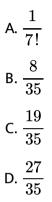**Answer: A**

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9. The probability that a leap year will have only 52 Sundays is

A. $\dfrac{4}{7}$

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

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

D. $\dfrac{1}{7}$

Answer: B

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10. A bag has four pair of balls of four distinct colours. If four balls are picked at random (without replacement), the probability that there is atleast one pair among them have the same colour is

A. $\dfrac{1}{7!}$

B. $\dfrac{8}{35}$

C. $\dfrac{19}{35}$

D. $\dfrac{27}{35}$

Answer: D

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11. Let ω be a complex cube root unity with $\omega \neq 1$. A fair die is thrown three times. If r_1, $r_2 and r_3$ are the numbers obtained on the die, then the probability that $\omega^{r_1} + \omega^{r_2} + \omega^{r_3} = 0$ is $1/18$ b. $1/9$ c. $2/9$ d. $1/36$

A. $\dfrac{1}{18}$

B. $\dfrac{1}{9}$

C. $\dfrac{2}{9}$

D. $\dfrac{1}{36}$

Answer: C

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12. A complete cycle of a traffic light takes 60 s. During each cycle the light is green for 25 s, yellow for 5 s and red for 30 s. At a randomly chosen time, the probability that the light will not be green is

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

B. $\dfrac{1}{4}$

C. $\dfrac{4}{12}$

D. $\dfrac{7}{12}$

Answer: D

13. The probability of choosing randomly a number c from the set {1,2,3,...,9} such that the quadratic equation $x^2 + 4x + c = 0$ has real roots, is

A. $\dfrac{1}{9}$

B. $\dfrac{2}{9}$

C. $\dfrac{3}{9}$

D. $\dfrac{4}{9}$

Answer: D

14. A bag contains 6 white and 4 black balls. Two balls are drawn at random. The probability that they are of the same color is

A. $\dfrac{1}{15}$

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

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

D. $\dfrac{7}{15}$

Answer: D

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15. A candidate takes three tests in succession and the probability of passing the first test is p. The probability of passing each succeeding test is p or $\dfrac{p}{2}$ according as he passes or fails in the preceding one. The candidate is selected, it he passes atleast two tests. The probability that the candidate is selected, is

A. $p^2(2-p)$

B. $p(2-p)$

C. $p + p^2 + p^3$

D. $p^2(1 - p)$

Answer: A

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16. A bag contains 3 white, 3 black and 2 red balls. One by one, three balls are drawn without replacing them. Find the probability that the third ball is red.

A. $\dfrac{2}{56}$

B. $\dfrac{3}{56}$

C. $\dfrac{1}{56}$

D. $\dfrac{14}{56}$

Answer: D

17. A ship is fitted with three engines E_1, E_2, and $E_{3,}$. The engines function independently of each other with respective probabilities $\frac{1}{2}, \frac{1}{4}$ and $\frac{1}{4}$,and For the ship to be operational at least two of its engines must function. Let X denote the event that the ship is operational and let X_1, X_2, and X_3 denote respectively the events that the engines E_1, E_2 and E_3,are functioning. Which of the following is (are) true?

A. $P(X_1^c/X) = 3/16$

B. P (exactly two engines of the ship are functioning) $= \frac{7}{10}$

C. $P(X/X_2) = \frac{5}{16}$

D. $P(X/X_1) = \frac{7}{16}$

Answer: D

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18. A signal which can be green or red with probability $\frac{4}{5}$ and $\frac{1}{5}$ respectively, is received by station A and then and 3 transmitted to station B. The probability of each station receiving the signal correctly is

$\frac{3}{4}$ If the signal received at station B is green, then the probability that the original signal was green is (a) $\frac{3}{5}$ (b) $\frac{6}{7}$ (d) $\frac{20}{23}$ (d) $\frac{9}{20}$

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

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

C. $\frac{20}{23}$

D. $\frac{9}{20}$

Answer: C

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19. One ticket is selected at random from 50 tickets numbered 00, 01, 02, ... , 49. Then the probability that the sum of the digits on the selected ticket is 8, given that the product of these digits is zero, equals (1) 1/14 (2) 1/7 (3) 5/14 (4) 1/50

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

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

C. $\dfrac{5}{14}$

D. $\dfrac{1}{50}$

Answer: A

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20. If A and B are any two events, then $P(A \cap B')$ is equal to

A. $P(A) + P(B')$

B. P(A)P(B)

C. $P(B) - P(A \cap B)$

D. $P(A) - P(A \cap B)$

Answer: D

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21. A person drwas out two balls successively from a bag containing 6 red and 4 white balls. The probability that atleast one of them will be red, is

A. $\dfrac{78}{90}$

B. $\dfrac{30}{90}$

C. $\dfrac{48}{90}$

D. $\dfrac{12}{90}$

Answer: A

22. If A and B are mutually exclusive events with $P(B) \neq 1,$ then $P(A/\overline{B})=$

A. $\dfrac{1}{P(B)}$

B. $\dfrac{1}{1 - P(B)}$

C. $\dfrac{P(A)}{P(B)}$

D. $\dfrac{P(A)}{1 - P(B)}$

Answer: D

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23. Seven chits are numbered 1 to 7. Four chits are drawn one by one with replacment. The probability that the least number appearing on any selected chit is 5 is :

A. $\left(\dfrac{3}{7}\right)^4$

B. $\left(\dfrac{6}{7}\right)^3$

C. $\dfrac{5.4.3}{7^3}$

D. $\left(\dfrac{3}{4}\right)^3$

Answer: A

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24. If n positive integers are taken at random and multiplied together, then the probability that the last digit of the product is 2,4,6 or 8, is

A. $\dfrac{4^n + 2^n}{5^n}$

B. $\dfrac{4^n \times 2^n}{5^n}$

C. $\dfrac{4^n - 2^n}{5^n}$

D. None of these

Answer: C

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25. X speaks truth in 60% and Y in 50% of the cases. Find the probability that they contradict each other narrating the same incident.

A. $\dfrac{1}{4}$

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

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

D. $\dfrac{2}{3}$

Answer: C

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26. The probability that in the toss of two dice, we obtain the sum 7 or 11

is

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

B. $\dfrac{1}{18}$

C. $\dfrac{2}{9}$

D. $\dfrac{23}{108}$

Answer: C

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27. If the probability for A to fail in an examination is 0.2 and that for B is 0.3, then the probability that either A or B fails, is (A) 0.38 (B) 0.44 (C) 0.50 (D) 0.94

A. 0.5

B. 0.44

C. 0.8

D. 0.25

Answer: B

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28. An integer is chosen at random from first 200 positive integers. Find the probability that the integer is divisible by 6 or 8.

A. $\dfrac{1}{4}$

B. $\dfrac{2}{4}$

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

D. None of these

Answer: A

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29. A biased coin with probability p, $0 < p < 1$ of heads is tossed until a head appears for the first time. If the probability that the number of tosses required is even is 2/5, then p equals

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

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

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

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

Answer: A

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30. A coin and a six faced die, both unbiased, are thrown simultaneously. The probability of getting a head on the coin and an odd number on the die is

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

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

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

D. $\dfrac{2}{3}$

Answer: C

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Exercise 1 Topical Problems

1. The probability distribution of a random variable X is given as

Then, the value of p is

X	-5	-4	-3	-2	-1	0	1	2	3	4	5
$P(X)$	p	$2p$	$3p$	$4p$	$5p$	$7p$	$8p$	$9p$	$10p$	$11p$	$12p$

A. $\dfrac{1}{72}$

B. $\dfrac{3}{73}$

C. $\dfrac{5}{72}$

D. $\dfrac{1}{74}$

Answer: A

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2. If the random variable X takes the values $x_1, x_2, x_3 \ldots , x_{10}$ with probablilities $P(X = x_i) = ki$, then the value of k is equal to

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

B. $\dfrac{1}{4}$

C. $\dfrac{1}{55}$

D. $\dfrac{7}{12}$

Answer: C

---

3. The distribution of a random variable X is goven below

The value of k is

X	-2	-1	0	1	2	3
P(X)	$\dfrac{1}{10}$	k	$\dfrac{1}{5}$	$2k$	$\dfrac{3}{10}$	k

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

B. $\dfrac{2}{10}$

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

D. $\dfrac{7}{10}$

Answer: A

4. A random variable X has the following probability distribution. Then the value of (i) k (ii) $P(X < 3)$ (iii) $P(X > 6)$ (iv) $P(0 < X < 3)$

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

A. $\dfrac{1}{10}, \dfrac{3}{10}, \dfrac{17}{100}$ and $\dfrac{3}{10}$

B. $\dfrac{1}{10}, \dfrac{3}{10}, \dfrac{3}{10}$ and $\dfrac{17}{100}$

C. $\dfrac{17}{100}, \dfrac{1}{10}, \dfrac{3}{10}$ and $\dfrac{3}{10}$

D. None of these

Answer: A

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5. Following is the probability density function $f(x) = pxe^{-4x^2}, 0 \le x \le \infty$. Then the value of p is

A. 8

B. 5

C. 7

D. -1

Answer: A

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---

6. If the probability density function of a continuous random variable X is

$$f(x) = \begin{cases} \frac{3+2x}{18} & 2 \le x \le 4 \\ 0 & x < 2 \ \text{or} \ x > 4 \end{cases}$$ Then the mathematical expectation of

X is

A. $\dfrac{83}{27}$

B. $\dfrac{27}{83}$

C. $\dfrac{87}{23}$

D. $\dfrac{38}{72}$

Answer: A

---

7. If the range ot a random vaniabie X is $0, 1, 2, 3,$ at $P(X = K) = \left(\dfrac{K+1}{3^k} \right)$ a for $k \geq 0,$ then a equals

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

B. $\dfrac{4}{9}$

C. $\dfrac{8}{27}$

D. $\dfrac{16}{81}$

Answer: B

---

8. A discrete random variable X has the following probability distribution

the value of C and the mean of the distribution are

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

A. $\dfrac{1}{10}$ and 3.66

B. $\dfrac{1}{20}$ and 2.66

C. $\dfrac{1}{15}$ and 1.33

D. None of these

Answer: A

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9. If pdf of a curve X is $f(x) = ae^{-ax}, x \geq 0, a > 0$

If $P(0 < X < K) = 0.5$, then the k is equal to

A. $\dfrac{1}{8}$

B. $\dfrac{1}{a}\log 2$

C. $\dfrac{1}{2}\log 2$

D. $\dfrac{1}{a}\log a$

Answer: B

10. If the pdf of a curve X is

$$f(x) = \begin{cases} \frac{x}{8} & 0 < x < 4 \\ 0 & \text{elsewhere} \end{cases}$$

Then $P(X < 1)$ and $P(X \geq 2)$ are

A. $\dfrac{1}{16}, \dfrac{3}{4}$

B. $\dfrac{1}{4}, \dfrac{3}{8}$

C. $\dfrac{5}{8}, \dfrac{7}{16}$

D. None of these

Answer: A

11. A random variable X has the following probability distribution.

Then, the mean of X is

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

A. 3

B. 1

C. 4

D. 2

Answer: A

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12. For a random variable X, E(X)=3 and $E(X^2) = 11$ Then, variance of X is

A. 8

B. 5

C. 2

D. 1

Answer: C

---

13. If m and σ^2 are the mean and variance of the random variable X whose

distribution is given by

X	0	1	2	3
P(X)	$\frac{1}{3}$	$\frac{1}{2}$	0	$\frac{1}{6}$

A. $m = \sigma^2 = 2$

B. $m = 1, \sigma^2 = 2$

C. $m = \sigma^2 = 1$

D. $m = 2, \sigma^2 = 1$

Answer: C

14. A random variable X has the probability distribution

For the events E = {X is a prime number} abd $F = \{X < 4\}$, $P(E \cup F)$ is

X	1	2	3	4	5	6	7	8
$P(X)$	0.15	0.23	0.12	0.10	0.20	0.08	0.07	0.05

A. 0.77

B. 0.87

C. 0.35

D. 0.5

Answer: A

15. In a dice game , a player pays a stake of ₹1 for each throw of a die. She receives ₹5, if the die shows a 3, ₹ 2, if the die shows a 1 or 6 and nothing

otherwise, then what is the player's expected profit per throw over a long series of throws?

A. 0.5

B. 0.2

C. 0.7

D. 0.9

Answer: A

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16. Anil's company estimates the net profit on a new products, it is launching to ₹ 3,000,000 during the first year if it successful ₹ 1,000,000 if it is unsuccessful The company assigns the following probabillities to first yesar prospects for the product successful: 0.15 moderately successful 0.25 and unseccessful 0.60 . Then the standard deviation of first year net profit fot the product (in million) is

A. 1.48

B. 12.4

C. 13.8

D. None of these

Answer: A

---

17. मान लीजिए दो पासों को फेंकने पर प्राप्त संख्याओं के योग को X से व्यक्त किया गया है। X का प्रसारण और मानक विचलन ज्ञात कीजिए।

A. $\dfrac{31}{6}$ and $\sqrt{\dfrac{31}{6}}$

B. $\dfrac{35}{6}$ and $\sqrt{\dfrac{35}{6}}$

C. $\dfrac{17}{6}$ and $\sqrt{\dfrac{17}{6}}$

D. None of these

Answer: B

18. एक कक्षा में 15 छात्र हैं जिनकी आयु 14,17,15,14,21,1719,20,1618,20,17,16 19 और 20 वर्ष हैं। एक छात्र को इस प्रकार चुना गया कि प्रत्येक छात्र के चुने जाने की संभावना समान है और चुने गए छात्र की आयु (X) को लिखा गया। याहच्छिक चर X का प्रायिकता बंटन ज्ञात कीजिए। X का माध्य प्रसरण व मानक विचलन भी ज्ञात कीजिए।

A. 17.53,4.8 and 2.19

B. 2.19, 4.8 and 17.53

C. 17.53,2.19 and 4.8

D. None of these

Answer: A

19. Two cards are drawn successively with replacement from a well shuffled deck of 52 cards, then the meanof the number of aces is

A. $\dfrac{1}{13}$

B. $\dfrac{3}{13}$

C. $\dfrac{2}{13}$

D. None of these

Answer: C

20. A random variable X takes the values $0, 1, 2, 3, \ldots,$ with prbability $PX(=x) = k(x+1)\left(\dfrac{1}{5}\right)^{x}$, where k is a constant, then $P(X = 0)$ is.

A. $\dfrac{7}{25}$

B. $\dfrac{18}{25}$

C. $\dfrac{13}{25}$

D. $\dfrac{16}{25}$

Answer: D

21. The pdf of a discrete random variable is defined as

$$f(x) = \begin{cases} kx^2, 0 \le x \le 6 \\ 0, \quad \text{elsewhere} \end{cases}$$

Then the value of F(4) is

A. $\dfrac{30}{91}$

B. $\dfrac{30}{97}$

C. $\dfrac{15}{47}$

D. None of these

Answer: A

22. Let the random variable X is defined as time (in minutes) that elapses

between the bell and end of the lecture in case of collagen professor

whrer pdf is defined as $f(x) = \begin{cases} kx^2, 0 \le x < 2 \\ 0, \quad \text{elsewhere} \end{cases}$

find the probability that lecture continue for atleast 90s beyond the bell

A. $\dfrac{37}{64}$

B. $\dfrac{35}{64}$

C. $\dfrac{33}{69}$

D. None of these

Answer: A

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23. The probability distribution of a random variable X is given as

Then, the value of p is

X	− 5	− 4	− 3	− 2	−1	0	1	2	3	4	5
P(X)	p	2p	3p	4p	5p	7p	8p	9p	10p	11p	12p

A. $\dfrac{1}{72}$

B. $\dfrac{3}{73}$

C. $\dfrac{5}{72}$

D. $\dfrac{1}{74}$

Answer: A

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24. If the random variable X takes the values $x_1, x_2, x_3 \ldots, x_{10}$ with probablilities $P(X = x_i) = ki$, then the value of k is equal to

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

B. $\dfrac{1}{4}$

C. $\dfrac{1}{55}$

D. $\dfrac{7}{12}$

Answer: C

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25. The distribution of a random variable X is goven below

The value of k is

X	-2	-1	0	1	2	3
P(X)	$\dfrac{1}{10}$	k	$\dfrac{1}{5}$	2k	$\dfrac{3}{10}$	k

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

B. $\dfrac{2}{10}$

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

D. $\dfrac{7}{10}$

Answer: A

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26. A random variable X has the following probability distribution. Then the value of (i) k (ii) $P(X < 3)$ (iii) $P(X > 6)$ (iv) $P(0 < X < 3)$

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

A. $\dfrac{1}{10}, \dfrac{3}{10}, \dfrac{17}{100}$ and $\dfrac{3}{10}$

B. $\dfrac{1}{10}, \dfrac{3}{10}, \dfrac{3}{10}$ and $\dfrac{17}{100}$

C. $\dfrac{17}{100}, \dfrac{1}{10}, \dfrac{3}{10}$ and $\dfrac{3}{10}$

D. None of these

Answer: A

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27. Following is the probability density function

$f(x) = pxe^{-4x^2}, 0 \le x \le \infty$. Then the value of p is

A. 8

B. 5

C. 7

D. -1

Answer: A

28. If the probability density function of a continuous random variable X is

$$f(x) = \begin{cases} \frac{3+2x}{18} & 2 \le x \le 4 \\ 0 & x2 \;\; \text{or} x > 4 \end{cases}$$

Then the mathematical expectation of X is

A. $\dfrac{83}{27}$

B. $\dfrac{27}{83}$

C. $\dfrac{87}{23}$

D. $\dfrac{38}{72}$

Answer: A

29. If the range ot a random vaniabie X is $0, 1, 2, 3,$ at

$P(X = K) = \left(\dfrac{K+1}{3^k} \right)$ a for $k \geq 0,$ then a equals

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

B. $\dfrac{4}{9}$

C. $\dfrac{8}{27}$

D. $\dfrac{16}{81}$

Answer: B

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30. A discrete random variable X has the following probability

distribution

the value of C and the mean of the distribution are

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

A. $\dfrac{1}{10}$ and 3.66

B. $\dfrac{1}{20}$ and 2.66

C. $\dfrac{1}{15}$ and 1.33

D. None of these

Answer: A

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31. If pdf of a curve X is $f(x) = ae^{-ax}, x \geq 0, a > 0$

If $P(0 < X < K) = 0.5$, then the k is equal to

A. $\dfrac{1}{8}$

B. $\dfrac{1}{a}\log 2$

C. $\dfrac{1}{2}\log 2$

D. $\dfrac{1}{a}\log a$

Answer: B

32. If the pdf of a curve X is

$$f(x) = \begin{cases} \frac{x}{8} & 0 < x < 4 \\ 0 & \text{elsewhere} \end{cases}$$

Then $P(X < 1)$ and $P(X \geq 2)$ are

A. $\dfrac{1}{16}, \dfrac{3}{4}$

B. $\dfrac{1}{4}, \dfrac{3}{8}$

C. $\dfrac{5}{8}, \dfrac{7}{16}$

D. None of these

Answer: A

33. A random variable X has the following probability distribution.

Then, the mean of X is

X	1	2	3	4
P(X)	k	2k	3k	4k

A. 3

B. 1

C. 4

D. 2

Answer: A

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34. For a random variable X, E(X)=3 and $E(X^2) = 11$ Then, variance of X is

A. 8

B. 5

C. 2

D. 1

Answer: C

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35. If m and σ^2 are the mean and variance of the random variable X

whose distribution is given by

X	0	1	2	3
P(X)	$\dfrac{1}{3}$	$\dfrac{1}{2}$	0	$\dfrac{1}{6}$

A. $m = \sigma^2 = 2$

B. $m = 1, \sigma^2 = 2$

C. $m = \sigma^2 = 1$

D. $m = 2, \sigma^2 = 1$

Answer: C

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36. A random variable X has the probability distribution

For the events E = {X is a prime number} abd $F = \{X < 4\}, P(E \cup F)$ is

X	1	2	3	4	5	6	7	8
P(X)	0.15	0.23	0.12	0.10	0.20	0.08	0.07	0.05

A. 0.77

B. 0.87

C. 0.35

D. 0.5

Answer: A

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37. In a dice game , a player pays a stake of ₹1 for each throw of a die. She receives ₹5, if the die shows a 3, ₹ 2, if the die shows a 1 or 6 and nothing

otherwise, then what is the player's expected profit per throw over a long series of throws?

A. 0.5

B. 0.2

C. 0.7

D. 0.9

Answer: A

38. Anil's company estimates the net profit on a new products, it is launching to ₹ 3,000,000 during the first year if it successful ₹ 1,000,000 if it is unsuccessful The company assigns the following probabillities to first yesar prospects for the product successful: 0.15 moderately successful 0.25 and unseccessful 0.60 . Then the standard deviation of first year net profit fot the product (in million) is

A. 1.48

B. 12.4

C. 13.8

D. None of these

Answer: A

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39. मान लीजिए दो पासों को फेंकने पर प्राप्त संख्याओं के योग को X से व्यक्त किया गया है।

X का प्रसारण और मानक विचलन ज्ञात कीजिए।

A. $\dfrac{31}{6}$ and $\sqrt{\dfrac{31}{6}}$

B. $\dfrac{35}{6}$ and $\sqrt{\dfrac{35}{6}}$

C. $\dfrac{17}{6}$ and $\sqrt{\dfrac{17}{6}}$

D. None of these

Answer: B

40. A class has 15 students whose ages are 14,17,15,14,21,17,19,20,16,18,20,17,16,19 and 20 yr. One students is selected in such a manner that each has the same chance of being of chosen and the age X of the selected stuydent is recorded. Mean variance and standard deiation (SD) of X,are respectvely

A. 17.53,4.8 and 2.19

B. 2.19, 4.8 and 17.53

C. 17.53,2.19 and 4.8

D. None of these

Answer: A

41. Two cards are drawn successively with replacement from a well shuffled deck of 52 cards, then the meanof the number of aces is

A. $\dfrac{1}{13}$

B. $\dfrac{3}{13}$

C. $\dfrac{2}{13}$

D. None of these

Answer: C

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42. A random variable X takes the values 0, 1, 2, 3, ..., with prbability $PX(=x) = k(x+1)\left(\dfrac{1}{5}\right)^x$, where k is a constant, then $P(X=0)$ is.

A. $\dfrac{7}{25}$

B. $\dfrac{18}{25}$

C. $\dfrac{13}{25}$

D. $\dfrac{16}{25}$

Answer: D

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43. The pdf of a discrete random variable is defined as $f(x) = \begin{cases} kx^2, 0 \le x \le 6 \\ 0, \quad \text{elsewhere} \end{cases}$

Then the value of F(4) is

A. $\dfrac{30}{91}$

B. $\dfrac{30}{97}$

C. $\dfrac{15}{47}$

D. None of these

Answer: A

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44. Let the random variable X is defined as time (in minutes) that elapses between the bell and end of the lecture in case of collagen professor whrer pdf is defined as $f(x) = \begin{cases} kx^2, 0 \le x < 2 \\ 0, \quad \text{elsewhere} \end{cases}$

find the probability that lecture continue for atleast 90s beyond the bell

A. $\dfrac{37}{64}$

B. $\dfrac{35}{64}$

C. $\dfrac{33}{69}$

D. None of these

Answer: A

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Exercise 2 Miscellaneous Problems

1. If a random variable X has the following probability distribution values of X

Then $P(X \geq 6)$ is equal to

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

A. $\dfrac{19}{100}$

B. $\dfrac{81}{100}$

C. $\dfrac{9}{100}$

D. $\dfrac{91}{100}$

Answer: A

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2. Let X is a continuous random variable with probability density function

$$f(x) = \begin{cases} \frac{x}{6} + k & 0 \leq x \leq 3 \\ 0 & \text{otherwise} \end{cases}$$

The value of k is equal to

A. $\dfrac{1}{12}$

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

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

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

Answer: A

3. A random variable X has the probability distribution given below

Its variance is

X	1	2	3	4	5
$P(X=x)$	K	2K	3K	2K	K

A. $\dfrac{16}{3}$

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

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

D. $\dfrac{10}{3}$

Answer: B

---

4. If the pdf of a curve X is
$$f(x) = \begin{cases} k. \, e^{-\theta x}, \theta > 0, 0 \le x < \infty \\ 0, \, -\infty < x < 0 \end{cases} \text{ then k is equal to}$$

A. 1

B. $\dfrac{\theta}{2}$

C. θ

D. 2θ

Answer: C

---

5. A random variable X takes values 1,2,3 and 4 with probabilities $\dfrac{1}{6}, \dfrac{1}{3}, \dfrac{1}{3}, \dfrac{1}{6}$ respectively, then its mean and variance is equal to

A. $\dfrac{5}{2}, \dfrac{11}{12}$

B. $\dfrac{5}{2}, \dfrac{11}{16}$

C. $\dfrac{5}{3}, \dfrac{11}{16}$

D. $\dfrac{5}{3}, \dfrac{11}{12}$

Answer: A

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6. A function is defined as $f(x) = \begin{cases} 0, & \text{for } x > 2 \\ \frac{2x+3}{18} & \text{for } 2 \le x \le 4 \\ 0 & \text{for } x > 4 \end{cases}$

Then $P(2 < X < 3)$ is

A. $\dfrac{5}{9}$

B. $\dfrac{4}{9}$

C. $\dfrac{7}{9}$

D. $\dfrac{2}{9}$

Answer: B

7. A random variable has the following probability distribution

The value of p is

X	0	1	2	3	4	5	6	7
$P(x)$	0	$2p$	$2p$	$3p$	p^2	$2p^2$	$7p^2$	$2p$

A. $1/10$

B. -1

C. $-1/10$

D. None of these

Answer: A

8. A random variable X has the following probability distribution

The mean and standard deviation if X are rspectively

$X = x_i$	1	2	3	4
$P(X = x_i)$	0.1	0.2	0.3	0.4

A. 2 and 3

B. 3 and 1

C. 3 and $\sqrt{2}$

D. 2 and 1

Answer: B

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9. If X is a random variable with distribution given below

The value of k and its variance are

X	0	1	2	3
$P(X = x)$	k	3k	3k	k

A. $1/8, 22/27$

B. $1/8, 23/27$

C. $1/8, 24/27$

D. $1/8, 3/4$

Answer: D

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10. If a curve X has probability density function (pdf)

$$f(x) = \begin{cases} ax, 0 \le x \le 1 \\ a, 1 \le x \le 2 \\ 3a - ax, 2 \le x \le 3 \\ 0, otherewise \end{cases}$$

Then, a is equal to

A. 1

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

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

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

Answer: C

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11. For a random variable X, if E(X) = 5 and V(X) = 6, then $E(X^2)$ is equal to

A. 19

B. 31

C. 61

D. 11

Answer: B

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12. probability distribution of a random variable X is

If $a = P(X \geq 2)$ and $b = P(X < 3)$ then

x	0	1	2	3	4
P(X = x)	k	2k	4k	2k	k

A. $a < b$

B. $a > b$

C. a=b

D. None of these

Answer: C

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13. The pdf of a curve X is

$$f(x) = \begin{cases} \frac{k}{\sqrt{x}}, 0 < x < 4 \\ 0, x \leq 0 \ \text{ or } \ x \geq 4 \end{cases}$$

Then , $P(X \geq 1)$ is equal to

A. 0.2

B. 0.3

C. 0.4

D. 0.5

Answer: D

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14. The random variable X has the following probability distribution

Then, F(0) is equal to

x	− 3	−1	0	1	3
$P(X = x)$	0.05	0.45	0.20	0.25	0.05

A. 0.7

B. 0.2

C. -0.4

D. 0.4

Answer: A

---

15. The probability distribution of the random variable X is given by

Then, the value of V(X) is equal to

x	1	2	3	4
$P(X=x)$	$\dfrac{1}{8}$	$\dfrac{1}{2}$	$\dfrac{1}{8}$	$\dfrac{1}{4}$

A. 0

B. 1

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

D. $\dfrac{2}{3}$

Answer: B

16. If the pdf of a curve X is

$$f(x) = \begin{cases} 3(1 - 2x^2), 0 < x < 1 \\ 0, x \leq 0 \text{ or } x \geq 1 \end{cases}$$

Then, the cdf of X is equal to

A. $2x - 3x^2$

B. $3x - 4x^3$

C. $3x - 2x^3$

D. None of the above

Answer: C

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17. If the probability distribution of a random variable X is as given below

Then, mean and variance are

X = x	-2	-1	0	1	2	3
P(X = x)	$\frac{1}{10}$	k	$\frac{1}{5}$	2k	$\frac{3}{10}$	k

A. $\dfrac{4}{5}$ and $\dfrac{54}{25}$

B. $\dfrac{4}{10}$ and $\dfrac{54}{25}$

C. $\dfrac{4}{15}$ and $\dfrac{27}{25}$

D. None of these

Answer: A

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18. If random variable X has the following probability distribution. Then the value of a is

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

A. $\dfrac{7}{81}$

B. $\dfrac{5}{81}$

C. $\dfrac{2}{81}$

D. $\dfrac{1}{81}$

Answer: D

19. A random variable X is defined by

$$X = \begin{cases} 3 \text{ with probability } = \frac{1}{3} \\ 4 \text{ with probability } = \frac{1}{4} \\ 12 \text{ with probability } = \frac{5}{12} \end{cases}$$

Then, E(X) is

A. 6

B. 7

C. 5

D. 8

Answer: B

20. The life in hours of a ratio tube is continuous random variable with

pdf $f(x) = \begin{cases} \frac{100}{x^2}, x \geq 100 \\ 0, \text{else where} \end{cases}$ Then, the probability that the life of tube will

be less than 200 h if it is known that the tube is still functioning after 150

h of services is

A. $\dfrac{1}{4}$

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

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

D. None of these

Answer: A

21. If a random variable X has the following probability distribution values

of X

Then $P(X \geq 6)$ is equal to

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

A. $\dfrac{19}{100}$

B. $\dfrac{81}{100}$

C. $\dfrac{9}{100}$

D. $\dfrac{91}{100}$

Answer: A

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22. Let X is a continuous random variable with probability density function

$$f(x) = \begin{cases} \frac{x}{6} + k & 0 \leq x \leq 3 \\ 0 & \text{otherwise} \end{cases}$$

The value of k is equal to

A. $\dfrac{1}{12}$

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

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

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

Answer: A

23. A random variable X has the probability distribution given below

Its variance is

X	1	2	3	4	5
$P(X=x)$	K	2K	3K	2K	K

A. $\dfrac{16}{3}$

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

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

D. $\dfrac{10}{3}$

Answer: B

---

24. If the pdf of a curve X is

$$f(x) = \begin{cases} k.\, e^{-\theta x}, \theta > 0, 0 \le x < \infty \\ 0, \infty < x < 0 \ \ \text{then k is equal to} \end{cases}$$

A. 1

B. $\dfrac{\theta}{2}$

C. θ

D. 2θ

Answer: C

---

25. A random variable X takes values 1,2,3 and 4 with probabilities $\dfrac{1}{6}, \dfrac{1}{3}, \dfrac{1}{3}, \dfrac{1}{6}$ respectively, then its mean and variance is equal to

A. $\dfrac{5}{2}, \dfrac{11}{12}$

B. $\dfrac{5}{2}, \dfrac{11}{16}$

C. $\dfrac{5}{3}, \dfrac{11}{16}$

D. $\dfrac{5}{3}, \dfrac{11}{12}$

Answer: A

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26. A function is defined as $f(x) = \begin{cases} 0, & \text{for } x > 2 \\ \dfrac{2x+3}{18} & \text{for } 2 \le x \le 4 \\ 0 & \text{for } x > 4 \end{cases}$

Then $P(2 < X < 3)$ is

A. $\dfrac{5}{9}$

B. $\dfrac{4}{9}$

C. $\dfrac{7}{9}$

D. $\dfrac{2}{9}$

Answer: B

27. A random variable has the following probability distribution

The value of p is

X	0	1	2	3	4	5	6	7
P(x)	0	2p	2p	3p	p^2	$2p^2$	$7p^2$	2p

A. $1/10$

B. -1

C. $-1/10$

D. None of these

Answer: A

28. A random variable X has the following probability distribution

The mean and standard deviation if X are rspectively

$X = x_i$	1	2	3	4
$P(X = x_i)$	0.1	0.2	0.3	0.4

A. 2 and 3

B. 3 and 1

C. 3 and $\sqrt{2}$

D. 2 and 1

Answer: B

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29. If X is a random variable with distribution given below

The value of k and its variance are

X	0	1	2	3
$P(X = x)$	k	3k	3k	k

A. $1/8, 22/27$

B. $1/8, 23/27$

C. $1/8, 24/27$

D. $1/8, 3/4$

Answer: D

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30. If a curve X has probability density function (pdf)

$$f(x) = \begin{cases} ax, 0 \le x \le 1 \\ a, 1 \le x \le 2 \\ 3a - ax, 2 \le x \le 3 \\ 0, otherewise \end{cases}$$

Then, a is equal to

A. 1

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

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

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

Answer: C

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31. For a random variable X, if E(X) = 5 and V(X) = 6, then $E(X^2)$ is equal to

A. 19

B. 31

C. 61

D. 11

Answer: B

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32. probability distribution of a random variable X is

If $a = P(X \geq 2)$ and $b = P(X < 3)$ then

x	0	1	2	3	4
P(X = x)	k	2k	4k	2k	k

A. $a < b$

B. $a > b$

C. a=b

D. None of these

Answer: C

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33. The pdf of a curve X is

$$f(x) = \begin{cases} \frac{k}{\sqrt{x}}, 0 < x < 4 \\ 0, x \leq 0 \text{ or } x \geq 4 \end{cases}$$

Then , $P(X \geq 1)$ is equal to

A. 0.2

B. 0.3

C. 0.4

D. 0.5

Answer: D

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34. The random variable X has the following probability distribution

Then, F(0) is equal to

x	− 3	−1	0	1	3
$P(X = x)$	0.05	0.45	0.20	0.25	0.05

A. 0.7

B. 0.2

C. -0.4

D. 0.4

Answer: A

35. The probability distribution of the random variable X is given by

Then, the value of V(X) is equal to

x	1	2	3	4
$P(X=x)$	$\dfrac{1}{8}$	$\dfrac{1}{2}$	$\dfrac{1}{8}$	$\dfrac{1}{4}$

A. 0

B. 1

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

D. $\dfrac{2}{3}$

Answer: B

36. If the pdf of a curve X is

$$f(x) = \begin{cases} 3(1 - 2x^2), 0 < x < 1 \\ 0, x \leq 0 \ \text{ or } \ x \geq 1 \end{cases}$$

Then, the cdf of X is equal to

A. $2x - 3x^2$

B. $3x - 4x^3$

C. $3x - 2x^3$

D. None of the above

Answer: C

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37. If the probability distribution of a random variable X is as given below

Then, mean and variance are

X = x	-2	-1	0	1	2	3
P(X = x)	$\frac{1}{10}$	k	$\frac{1}{5}$	$2k$	$\frac{3}{10}$	k

A. $\dfrac{4}{5}$ and $\dfrac{54}{25}$

B. $\dfrac{4}{10}$ and $\dfrac{54}{25}$

C. $\dfrac{4}{15}$ and $\dfrac{27}{25}$

D. None of these

Answer: A

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38. If random variable X has the following probability distribution. Then the value of a is

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

A. $\dfrac{7}{81}$

B. $\dfrac{5}{81}$

C. $\dfrac{2}{81}$

D. $\dfrac{1}{81}$

Answer: D

39. A random variable X is defined by

$$X = \begin{cases} 3 \text{ with probability} = \frac{1}{3} \\ 4 \text{ with probability} = \frac{1}{4} \\ 12 \text{ with probability} = \frac{5}{12} \end{cases}$$

Then, E(X) is

A. 6

B. 7

C. 5

D. 8

Answer: B

40. The life in hours of a ratio tube is continuous random variable with pdf

$$f(x) = \begin{cases} \frac{100}{x^2}, x \geq 100 \\ 0, \text{else where} \end{cases}$$

Then, the probability that the life of tube will than 200 h if it is known that th tube is still functioning after 150 h of services is

A. $\dfrac{1}{4}$

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

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

D. None of these

Answer: A

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Mht Cet Corner

1. If a random variable waiting time in minutes for bus and probability density function of x is given by

$$f(x) = \begin{cases} \frac{1}{5}, 0 \le x \le 5 \\ 0, otherwise \end{cases}$$

Then probability of waiting time not more than 4 minutes is equal to

A. 0.3

B. 0.8

C. 0.2

D. 0.5

Answer: B

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2. If the probability density function of a random variable X is given as

then F(0) is equal to

x_i	– 2	– 1	0	1	2
$P(X = x_i)$	0.2	0.3	0.15	0.25	0.1

A. $P(X < 0)$

B. $P(X > 0)$

C. $1 - P(X > 0)$

D. $1 - PX < 0)$

Answer: C

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3. If a random variable waiting time in minutes for bus and probability density function of x is given by

$$f(x) = \begin{cases} \frac{1}{5}, 0 \le x \le 5 \\ 0, \text{otherwise} \end{cases}$$

Then probability of waiting time not more than 4 minutes is equal to

A. 0.3

B. 0.8

C. 0.2

D. 0.5

Answer: B

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4. If the probability density function of a random variable X is given as

then F(0) is equal to

x_i	-2	-1	0	1	2
$P(X = x_i)$	0.2	0.3	0.15	0.25	0.1

A. $P(X < 0)$

B. $P(X > 0)$

C. $1 - P(X > 0)$

D. $1 - PX < 0)$

Answer: C

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