



MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

BINOMIAL DISTRIBUTION

Exercise 1 Topical Problems

1. The value of $B \left(4, \frac{1}{4} \right)$ at $r=3$ is

A. $\frac{1}{64}$

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

C. $\frac{5}{64}$

D. $\frac{3}{32}$

Answer: B



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2. In a box containing 100 eggs 10 eggs are rotten the probability that out of a sample of 5

eggs, none is rotten (if the sampling is with replacement)

A. $\left(\frac{1}{10}\right)^5$

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

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

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

Answer: D



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3. If two coins are tossed five times, then the probability of getting 5 heads and 5 tails is

A. $\frac{63}{256}$

B. $\frac{1}{1024}$

C. $\frac{2}{205}$

D. $\frac{9}{64}$

Answer: A



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

A. 0.936

B. 0.784

C. 0.904

D. None of these

Answer: B





5. If in a binomial distribution

$$n = 4, P(X = 0) = \frac{16}{81}, \text{ then } P(X = 4)$$

equals $\frac{1}{16}$ b. $\frac{1}{81}$ c. $\frac{1}{27}$ d. $\frac{1}{8}$

A. $\frac{1}{16}$

B. $\frac{1}{81}$

C. $\frac{1}{27}$

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

Answer: B



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6. A radar complex consists of eight units that operate independently. The probability that a unit detects an incoming missile is 0.9. Then the probability that an incoming missile will not be detected by any unit is

A. $\left(\frac{9}{10}\right)^4$

B. $9\left(\frac{1}{10}\right)^5$

C. $\frac{1}{10^8}$

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

Answer: C



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7. Five coins whose faces are marked 2, 3 are thrown. What is the probability of obtaining a total of 12?

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

B. $\frac{1}{16}$

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

D. $\frac{5}{16}$

Answer: D



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8. One hundred identical coins, each with probability p , of showing up heads are tossed once. If θ

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

B. $\frac{49}{101}$

C. $\frac{50}{101}$

D. $\frac{51}{101}$

Answer: D



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9. एक थैले में 10 गेंदें हैं जिनमें से प्रत्येक पर 0 से 9 तक के अंकों में से एक अंक लिखा है। यदि थैले से 4 गेंदें उत्तरोत्तर पुनः वापस रखते हुए निकाली जाती हैं तो इसकी क्या

प्रायिकता है कि उनमें से किसी भी गेंद पर अंक 0 न लिखा हो?

A. $\left(\frac{9}{10}\right)^2$

B. $\left(\frac{9}{10}\right)^3$

C. $\left(\frac{9}{10}\right)^4$

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

Answer: C



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

A. $\frac{25}{128}$

B. $\frac{13}{216}$

C. $\frac{25}{216}$

D. $\frac{11}{128}$

Answer: C



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11. On a multiple choice examination with three possible answers (out of which only one is correct) for each of the five questions, what is the probability that a candidate would get four or more correct answers just by guessing?

A. $\frac{3}{243}$

B. $\frac{1}{243}$

C. $\frac{25}{243}$

D. $\frac{11}{243}$

Answer: D



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12. India plays two matches each with West Indies and Australia. In any match the probabilities of India getting points 0, 1 and 2 are 0.45, 0.05 and 0.50 respectively. Assuming that the outcomes are independent, the probability of India getting at least 7 points is (a) 0.8750 (b) 0.0875 (c) 0.0625 (d) 0.0250

A. $\frac{1}{80}$

B. $\frac{7}{80}$

C. $\frac{7}{8}$

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

Answer: C



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13. A box contains 100 bulbs out of which 10 are defective. A sample of 5 bulbs is drawn.

The probability that none is defective, is

A. 10^{-1}

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

C. $\left(\frac{1}{10}\right)^5$

D. $\frac{9}{10}$

Answer: C



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14. Un biased coin is tossed 6 times. The probability of getting atmost 4 heads is

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

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

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

D. $\frac{11}{32}$

Answer: B



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15. A dice is thrown 6 times. If 'getting an old number' is a success, then match the terms of column I with their respective values in

column II and choose the correct option from the codes given below.

	Column I		Column II
A.	P (5 successes)	1.	$\frac{63}{64}$
B.	P (atleast 5 successes)	2.	$\frac{7}{64}$
C.	P (atmost 5 successes)	3.	$\frac{3}{32}$

A. $A \quad B \quad C$
 $1 \quad 2 \quad 3$

B. $A \quad B \quad C$
 $3 \quad 1 \quad 2$

C. $A \quad B \quad C$
 $1 \quad 3 \quad 2$

D. $A \quad B \quad C$
 $3 \quad 2 \quad 1$

Answer: D



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16. A coin is tossed $2n$ times. The chance that the number of times one gets head is not equal to the number of times one gets tail is

A. ${}^{2n}C_n \left(\frac{1}{2}\right)^{2n}$

B. $1 - {}^{2n}C_n$

C. $1 - {}^{2n}C_n \left(\frac{1}{4^n}\right)$

D. None of the above

Answer: C



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17. If in a trial the probability of success is twice the probability of failure. In six trials the probability of at least four successes is

A. $\frac{496}{729}$

B. $\frac{400}{729}$

C. $\frac{500}{729}$

D. $\frac{600}{729}$

Answer: A



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18. A coin is tossed n times. The probability of getting head at least once is greater than 0.8.

Then the least value of n is

A. 2

B. 3

C. 5

D. 4

Answer: B



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19. The records of a hospital show that 10% of the cases of a certain disease are fatal. If 6 patients are suffering from the disease, then the probability that only three will die is

A. 8748×10^{-5}

B. 1458×10^{-5}

C. 1458×10^{-6}

D. 41×10^{-6}

Answer: B



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20. The probability that a bulb produced by a factory will fuse after 150 days of use is 0.05. If a sample of such 5 bulbs are taken out, then match the probabilities in column I with their respective values in column II and choose the

correct option from the codes given below.

	Column I	Column II
A.	P (none of them will fuse after 150 days of use)	1. $1 - (0.95)^5$
B.	P (not more than one) will fuse after 150 days of use	2. $1 - (0.95)^4 \times 1.2$
C.	P (more than one) will fuse after 150 days of use	3. $(0.95)^4 \times 1.2$
D.	P (atleast one) will fuse after 150 days of use	4. $(0.95)^5$

A. $A \quad B \quad C \quad D$
2 4 1 3

B. $A \quad B \quad C \quad D$
4 3 2 1

C. $A \quad B \quad C \quad D$
4 3 1 2

D. $A \quad B \quad C \quad D$
4 1 3 2

Answer: B



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21. In four throws with a pair of dice, what is the chance of throwing doublets twice at least?

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

B. $\frac{125}{144}$

C. $(17)/(144)^4$

D. $\frac{18}{144}$

Answer: A

22. In an examination, 20 questions of true-false type are asked. Suppose a student tosses a fair coin to determine his answer to each question. If the coin falls heads, he answers "true"; if it falls tails, he answers "false". Find the probability that

A.

$$\left(\frac{1}{2}\right)^{20} \left({}^{20}C_{12} + {}^{20}C_{13} + \dots + {}^{20}C_{20}\right)$$

B.

$$\left(\frac{1}{2}\right)^{10} \left({}^{20}C_{11} + {}^{20}C_{12} + \dots + {}^{20}C_{20}\right)$$

C.

$$\left(\frac{1}{2}\right)^{20} \left({}^{20}C_{11} + {}^{20}C_{12} + \dots + {}^{20}C_{20}\right)$$

D. None of the above

Answer: A



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23. The probability that a certain kind of component will survive a given shock test is $\frac{3}{4}$. Find the probability that among 5 components tested Exactly 2 will survive ii. At most 3 will survive

A. $\frac{9}{41}$

B. $\frac{25}{128}$

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

D. $\frac{27}{128}$

Answer: D



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24. Suppose X has a binomial distribution $B\left(6, \frac{1}{2}\right)$. Show that $X = 3$ is the most likely outcome. (Hint: $P(x = 3)$ is the maximum among all $P(x_i)$, $x_i = 0, 1, 2, 3, 4, 5, 6$)

A. $X=1$

B. $X=3$

C. $X=0$

D. $X=6$

Answer: B



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Exercise 1 Topical Problems Mean And Variance

1. A die is thrown 100 times, getting an even number is considered a success. The variance of the number of successes is

A. 50

B. 25

C. 10

D. 100

Answer: B



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2. The mean and variance of a random variable X having a binomial distribution are 4 and 2 respectively. The $P(X = 1)$ is

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

B. $\frac{1}{32}$

C. $\frac{1}{16}$

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

Answer: B



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3. A random variable X follows binomial distribution with mean α and variance β .

Then,

A. $0 < \alpha < \beta$

B. $0 < \beta < \alpha$

C. $\alpha < 0 < \beta$

D. $\beta < 0 < \alpha$

Answer: B



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4. In eight throws of a die 1 or 3 is considered a success. Then, the standard deviation of success, is

A. $\frac{16}{9}$

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

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

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

Answer: C



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5. The mean and the variance of a binomial distribution are 4 and 2 respectively. Then, the probability of 2 successes is

A. $\frac{28}{256}$

B. $\frac{219}{256}$

C. $\frac{128}{256}$

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

Answer: A



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6. A die is tossed 5 times. Getting an odd number is considered a success. Then, the variance of distribution of success, is

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

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

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

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

Answer: D



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7. The mean and variance of a random variable X having a binomial distribution are 4 and 2 respectively. Then, $P(X=6)$, is equal to

A. $\frac{1}{256}$

B. $\frac{3}{256}$

C. $\frac{9}{256}$

D. $\frac{7}{256}$

Answer: C



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Exercise 2 Miscellaneous Problem Mean And Variance

1. A fair coin is tossed n times. if the probability that head occurs 6 times is equal to the probability that head occurs 8 times, then find the value of n .

A. 7

B. 14

C. 16

D. 19

Answer: B



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2. A six-faced dice is so biased that it is twice as likely to show an even number as an odd number when thrown. It is thrown twice, the probability that the sum of two numbers thrown is even is $\frac{1}{12}$ b. $\frac{1}{6}$ c. $\frac{1}{3}$ d. $\frac{5}{9}$

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

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

C. $\frac{1}{9}$

D. None of these

Answer: B



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3. An unbiased coin is tossed a fixed number of times. If the probability of getting 4 heads equals the probability of getting 7 heads, then the probability of getting 2 heads, is

A. $\frac{55}{2048}$

B. $\frac{3}{4096}$

C. $\frac{1}{1024}$

D. None of these

Answer: A



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4. An experiment succeeds twice as often as it fails. The probability that in the next six trials there are at most 2 successes, is

A. $\frac{73}{729}$

B. $\frac{72}{729}$

C. $\frac{71}{729}$

D. $\frac{70}{729}$

Answer: A



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5. For a binomial variate X with $n=6$, if

$P(X = 4) = \frac{135}{2^{12}}$ then its variance is

A. $\frac{8}{9}$

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

C. $\frac{9}{8}$

D. 4

Answer: C



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6. In a binomial distribution the mean is 15 and variance is 10. Then, parameter n is

A. 28

B. 16

C. 45

D. 25

Answer: C



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7. The mean and variance of binomial distribution are 4 and 6 respectively. The probability of exactly six success in this distribution is

A. ${}^{16}C_6 \left(\frac{1}{4}\right)^6 \left(\frac{3}{4}\right)^{10}$

B. ${}^{16}C_6 \left(\frac{1}{4}\right)^{16} \left(\frac{3}{4}\right)^{20}$

C. ${}^{16}C_6 \left(\frac{1}{4}\right)^8 \left(\frac{3}{4}\right)^{12}$

D. ${}^{16}C_6 \left(\frac{1}{4}\right)^{16} \left(\frac{3}{4}\right)^{20}$

Answer: A



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8. The probability that a marksman will hit a target is given as $\frac{1}{5}$. Then, the probability that at least one hit in 10 shots is

A. $1 - \left(\frac{4}{5}\right)^{10}$

B. $\frac{1}{5^{10}}$

C. $1 - \frac{1}{5^{10}}$

D. None of these

Answer: A



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9. A carton contains 20 bulbs ,5 of which are defective. The probability that,if a sample of 3

bulbs in chosen at random from the carton, 2
will be defective, is

A. $\frac{1}{16}$

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

C. $\frac{9}{64}$

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

Answer: C



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10. Out of 800 families with 4 children each, the expected number of families having at least one boy is

A. 550

B. 50

C. 750

D. 300

Answer: C



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

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

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

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

Answer: A



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12. Five coins are tossed simultaneously. The probability that at least one head turning up, is

A. $\frac{1}{32}$

B. $\frac{5}{32}$

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

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

Answer: D



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13. The mean and standard deviation of a binomial variate X are 4 and $\sqrt{3}$ respectively.

Then, $P(X \geq 1) =$

A. $1 - \left(\frac{1}{4}\right)^{16}$

B. $1 - \left(\frac{3}{4}\right)^{16}$

C. $1 - \left(\frac{2}{3}\right)^{16}$

D. $1 - \left(\frac{1}{3}\right)^{16}$

Answer: B



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14. In a binomial distribution $B\left(n, p = \frac{1}{4}\right)$,

if the probability of at least one success is greater than or equal to $\frac{9}{10}$, then n is greater

than (1) $\frac{1}{(\log)_{10}^4 - (\log)_{10}^3}$ (2)

$\frac{1}{(\log)_{10}^4 + (\log)_{10}^3}$ (3) $\frac{1}{9}$ (4)

$\frac{1}{(\log)_{10}^4 - (\log)_{10}^3}$

A. $\frac{1}{\log_{10} 4 - \log_{10} 3}$

B. $\frac{1}{\log_{10} 4 + \log_{10} 3}$

C. $\frac{9}{\log_{10} 4 - \log_{10} 3}$

$$D. \frac{4}{\log_{10} 4 - \log_{10} 3}$$

Answer: A



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15. If the mean and the variance of a binomial variable X are 2 and 1 respectively, then the probability that X takes a value greater than one is equal to:

$$A. \frac{5}{16}$$

B. $\frac{8}{16}$

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

D. $\frac{1}{16}$

Answer: C



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16. If X is a binomial variate with the range

$\{0, 1, 2, 3, 4, 5, 6\}$ and

$P(X = 2) = 4P(X = 4)$, then the

parameter p of X is

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

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

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

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

Answer: A



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17. A dice has four blank faces and two faces marked 3. The change of getting a total of 12 in 5 throws is

A. ${}^5C_4 \left(\frac{1}{3}\right) (4) \left(\frac{2}{3}\right)$

B. ${}^5C_4 \left(\frac{1}{3}\right) \left(\frac{2}{3}\right)^4$

C. ${}^5C_4 \left(\frac{1}{6}\right)^5$

D. ${}^5C_4 \left(\frac{1}{6}\right)^4 \left(\frac{5}{6}\right)$

Answer: A



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18. If a dice is thrown twice, the probability of occurrence of 4 at least once is

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

B. $\frac{35}{36}$

C. $\frac{7}{12}$

D. None of these

Answer: A



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19. If X be binomial distribution with mean np

and variance npq , then find the $\frac{P(x = k)}{P(x = k - 1)}$

A. $\left(\frac{n - k}{k - 1}\right) \cdot \frac{p}{q}$

B. $\left(\frac{n - k + 1}{k}\right) \cdot \frac{p}{q}$

C. $\left(\frac{n + 1}{k}\right) \cdot \frac{q}{p}$

D. $\left(\frac{n - 1}{k + 1}\right) \cdot \frac{q}{p}$

Answer: B



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20. If X is a binomial variate with the range $\{0, 1, 2, 3, 4, 5, 6\}$ and $P(X = 2) = 4P(X = 4)$, then the parameter p of X is

A. $\frac{8}{9}$

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

C. $\frac{9}{8}$

D. 4

Answer: C



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21. A man takes a step forward with probability 0.4 and backward with probability 0.6. The probability that at the end of eleven steps he is just one step away from the starting point, is

A. ${}^{11}C_5(0.4)^6(0.6)^5$

B. ${}^{11}C_6(0.4)^5(0.6)^6$

C. ${}^{11}C_5(0.4)^5(0.6)^5$

D. ${}^nC_5(0.4)^5(0.6)^5$

Answer: C



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22. A man takes a forward step with probability (.8) and backward step with probability (.2). What is the probability that at the end of 9 steps he is exactly three steps away from starting points ?

A. $\frac{69888}{5^8}$

B. $\frac{5377}{5^8}$

C. $\frac{5378}{5^8}$

D. $\frac{5376}{5^8}$

Answer: A



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23. The probability of India winning a test match against England is $\frac{2}{3}$. Assuming independence from match to match, the probability that in a 7 match series India's third win occurs at the fifth match, is

A. $\frac{8}{27}$

B. $\frac{16}{81}$

C. $\frac{8}{81}$

D. $\frac{32}{81}$

Answer: B



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24. If X and Y are independent binomial variates $B\left(5, \frac{1}{2}\right)$ and $B\left(7, \frac{1}{2}\right)$ and the

value of $P(X + Y = 3)$ is

A. $\frac{35}{47}$

B. $\frac{55}{1024}$

C. $\frac{220}{512}$

D. $\frac{11}{204}$

Answer: B



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25. If A and B each toss three coins. The probability that both get the same number of heads is $\frac{1}{9}$ b. $\frac{3}{16}$ c. $\frac{5}{16}$ d. $\frac{3}{8}$

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

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

C. $\frac{5}{16}$

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

Answer: C



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26. A die is thrown 5 times. Find the probability that an odd number will come up exactly three times.

A. $\frac{5}{16}$

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

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

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

Answer: A



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27. If X follows a binomial distribution with parameters $n = 8$ and $p = 1/2$, then $p(|X - 4| \leq 2)$ equals

A. $\frac{118}{128}$

B. $\frac{119}{128}$

C. $\frac{117}{128}$

D. None of these

Answer: B



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28. A die is tossed thrice. If event of getting an even number is a success. Then the probability of getting at least two successes is

A. $\frac{7}{8}$

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

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

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

Answer: D



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29. The probability that in a family of 5 members, exactly two members have birthday on Sunday is:-

A. $\frac{12 \times 5^3}{7^5}$

B. $\frac{10 \times 6^2}{7^5}$

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

D. $\frac{10 \times 6^3}{7^5}$

Answer: D



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30. A fair die is thrown 20 times. The probability that on the 10th throw, the fourth six appears is ${}^{20}C_{10} \times 5^6 / 6^{20}$ b. $120 \times 5^7 / 6^{10}$ c. $84 \times 5^6 / 6^{10}$ d. none of these

A. $\frac{{}^{20}C_{10} \times 5^6}{6^{20}}$

B. $\frac{120 \times 5^7}{6^{10}}$

C. $\frac{84 \times 5^6}{6^{10}}$

D. None of these

Answer: C



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31. If the mean and the variance of a binomial variable X are 2 and 1 respectively, then the probability that X takes a value greater than one is equal to:

A. $\frac{9}{16}$

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

C. $\frac{1}{16}$

D. $\frac{15}{16}$

Answer: D



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32. From a lot of 15 bulbs which include 5 defectives, a sample of 4 bulbs is drawn one by one with replacement. Find the probability distribution of number of defective bulbs. Hence find the mean of the distribution.

A. 1.38

B. 1.33

C. 1.39

D. 1.40

Answer: B



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Mht Cet Corner

1. Let $X \sim B(n, p)$, if $E(X)=5, \text{Var}(X) = 2.5$ then $P(X < 1)$ is equal to

A. $\left(\frac{1}{2}\right)^{11}$

B. $\left(\frac{1}{2}\right)^{10}$

C. $\left(\frac{1}{2}\right)^6$

D. $\left(\frac{1}{2}\right)^9$

Answer: B



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2. Probability of guessing correctly at least 7 out of 10 answers in a 'True' or 'False' test is equal to

A. $\frac{11}{64}$

B. $\frac{11}{32}$

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

D. $\frac{27}{32}$

Answer: A



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3. If random variable $X \sim B\left(n = 5, P = \frac{1}{3}\right)$,

then $P(2 < X < 4)$ is equal to

A. $\frac{80}{243}$

B. $\frac{40}{243}$

C. $\frac{40}{343}$

D. $\frac{80}{343}$

Answer: B



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4. 15 coins are tossed , the probability of getting heads will be

A. $\frac{511}{32768}$

B. $\frac{1001}{32768}$

C. $\frac{3003}{32768}$

D. $\frac{3005}{32768}$

Answer: C



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5. If X follows the binomial distribution with parameters $n=6$ and p and $9P(X=4)=P(X=2)$, then p is

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

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

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

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

Answer: A



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6. Two coins are tossed simultaneously. Then, the value of $E(X)$, where X denotes the number of heads is

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

B. 2

C. 1

D. None of these

Answer: C



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