



# MATHS

## BOOKS - TARGET MATHS (HINGLISH)

### BINOMIAL DISTRIBUTION

#### Classical Thinking

1. If there are  $n$  independent trials,  $p$  and  $q$  are the probability of success and failure

respectively, then probability of exactly  $r$  success

A.  ${}^n C_{n+r} p^r q^{n-r}$

B.  ${}^n C_n p^{r-1} q^{r+1}$

C.  ${}^n C_r p^r q^{n-r}$

D.  ${}^n C_r p^{r+1} q^{r-1}$

**Answer: C**



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2. Let  $X \sim B(10, 0.2)$  then  $p(x=1)$  is

A. 0.2684

B. 0.3684

C. 0.4684

D. 0.5684

**Answer: A**



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3. In a simultaneous toss of four coins, the probability of getting exactly three heads is

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

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

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

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

**Answer: C**



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4. In tossing 10 coins, the probability of getting exactly 5 heads is

A.  $\frac{9}{128}$

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

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

D.  $\frac{193}{256}$

**Answer: B**



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5. If a die is thrown 7 times, then the probability of obtaining 5 exactly 4 times is

A.  ${}^7C_4 \left(\frac{1}{6}\right)^4 \left(\frac{5}{6}\right)^3$

B.  ${}^7C_4 \left(\frac{1}{6}\right)^3 \left(\frac{5}{6}\right)^4$

C.  $\left(\frac{1}{6}\right)^4 \left(\frac{5}{6}\right)^3$

D.  $\left(\frac{1}{6}\right)^3 \left(\frac{5}{6}\right)^4$

**Answer: A**



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6. A die is thrown 5 times, then the probability that an even number will come up exactly 3 times is

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

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

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

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

**Answer: A**



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7. A die is thrown 2 times. If getting an odd number is considered as a success, then the probability of 2 successes is

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

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

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

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

**Answer: D**



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8. A coin is tossed 3 times. The probability of obtaining at least 2 heads is

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

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

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

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

**Answer: C**



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9. 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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## Critical Thinking

1. The probability that a student is not a swimmer is  $\frac{1}{5}$ . Then the probability that out of five students, four are swimmers is (A)

${}^5C_4 \frac{\left(\frac{4}{5}\right)^4}{5}$  (B)  $\frac{\left(\frac{4}{5}\right)^4}{5}$  (C)  ${}^5C_1 \frac{1}{5} \left(\frac{4}{5}\right)^4$

(D) None of these

A.  ${}^5C_1 \left(\frac{4}{5}\right)^4 \left(\frac{1}{5}\right)$

B.  ${}^5C_1 \left(\frac{4}{5}\right) \left(\frac{1}{5}\right)^4$

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

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

**Answer: B**



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2. A man makes attempts to hit the target. The probability of hitting the target is  $\frac{3}{5}$ . Then the probability that a man hits the target exactly 2 times in 5 attempts, is

A.  $\frac{144}{625}$

B.  $\frac{72}{3125}$

C.  $\frac{216}{625}$

D.  $\frac{32}{3125}$

**Answer: B**



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**3.** The probability that a bulb produced by a factory will fuse after 150 days if used is 0.50. what is the probability that our of 5 such bulbs none will fuse after 150 days of use?

1 -  $(19/20)^5$    b.  $(19/20)^5$    c.  $(3/4)^5$    d.

$90(1/4)^5$

A.  $1 - \left(\frac{19}{20}\right)^5$

B.  $\left(\frac{19}{20}\right)^5$

C.  $\left(\frac{3}{4}\right)^5$

D.  $90\left(\frac{1}{4}\right)^5$

**Answer: A**



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4. A contest consist of predicting the result win, draw or defeat of 7 football matches. A sent his entry predicting at random. The probability that his entry will contain exactly 4 correct predictions is

A.  $\frac{8}{3^7}$

B.  $\frac{16}{3^7}$

C.  $\frac{280}{3^7}$

D.  $\frac{560}{3^7}$

**Answer: B**



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5. A coin is tossed successively three times.

The probability of getting exactly one heads or

2 heads is

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

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

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

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

**Answer: D**





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6. A die is thrown 10 times. If getting an even number is considered as a success, then the probability of four successes is

A.  ${}^{10}C_4 \left(\frac{1}{2}\right)^4$

B.  ${}^{10}C_4 \left(\frac{1}{2}\right)^6$

C.  ${}^{10}C_4 \left(\frac{1}{2}\right)^8$

D.  ${}^{10}C_6 \left(\frac{1}{2}\right)^{10}$

**Answer: D**



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

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

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

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

D. 1

**Answer: C**



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**8.** A die is thrown 3 times. Getting a 3 or 6 on the top face is considered success. Then the probability of at least 2 successes is

A.  $\frac{2}{9}$

B.  $\frac{7}{27}$

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

D.  $\frac{5}{27}$

**Answer: B**



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

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

B.  $\frac{371}{464}$

C.  $\frac{471}{502}$

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

**Answer: D**



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**10.** If three dice are thrown together, then the probability of getting 5 on at least one of them is

A.  $\frac{125}{216}$

B.  $\frac{215}{216}$

C.  $\frac{1}{216}$

D.  $\frac{91}{216}$

**Answer: D**



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**11.** 8 coins are tossed simultaneously. The probability of getting at least 6 heads is

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

B.  $\frac{229}{256}$

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

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

**Answer: D**



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**12.** A fair coin is tossed a fixed number of times. If the probability of getting seven heads is equal to that of getting nine heads, the probability of getting two heads, is

A.  $\frac{35}{2^{12}}$

B.  $\frac{35}{2^{14}}$

C.  $\frac{7}{2^{12}}$

D.  $\frac{7}{2^{14}}$

**Answer: A**



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**13.** For a binomial distribution,

A. Mean  $<$  variance

B. Mean  $=$  variance

C. Mean  $>$  variance

D. Mean  $= 1 -$  variance



**Answer: C**



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**14.** A die is thrown thrice. If getting a four is considered a success, then the mean and variance of the distribution of the number of successes are

A.  $\frac{1}{2}, \frac{1}{12}$

B.  $\frac{1}{6}, \frac{5}{12}$

C.  $\frac{5}{6}, \frac{1}{2}$

D.  $\frac{1}{2}, \frac{5}{12}$

**Answer: D**



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

A.  $\frac{2}{9}$

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

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

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

**Answer: B**



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**16.** 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.  $\frac{2}{3}$

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

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

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

**Answer: D**



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**17.** The mean and variance of a binomial distribution are 4 and 3 respectively. Then the

probability of getting exactly six successes in this distribution, is

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

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

C.  ${}^{12}C_6 \left(\frac{1}{4}\right)^{10} \left(\frac{3}{4}\right)^6$

D.  ${}^{12}C_6 \left(\frac{1}{4}\right)^6 \left(\frac{3}{4}\right)^6$

**Answer: B**



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18. A card is drawn at random 4 times, with replacement, from a pack of 52 playing cards. If getting a red card is considered as success, then the mean and variance of the distribution are respectively

A. 1,2

B. 2,1

C.  $1, \frac{3}{4}$

D.  $\frac{3}{4}, 1$

**Answer: B**



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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.  $\frac{n - k}{k - 1} \cdot \frac{p}{q}$

B.  $\frac{n - k + 1}{k} \cdot \frac{p}{q}$

C.  $\frac{n + 1}{k} \cdot \frac{q}{p}$

D.  $\frac{n - 1}{k + 1} \cdot \frac{q}{p}$

**Answer: B**



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

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

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

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

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



**Answer: C**



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## Competitive Thinking

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

$$P(2 > X > 4) =$$

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

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

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

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

**Answer: B**



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2. A coin is tossed 10 times. The probability of getting exactly six heads is

A.  $\frac{512}{513}$

B.  $\frac{105}{512}$

C.  $\frac{100}{153}$

D.  ${}^{10}C_6$

**Answer: B**



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3. If a die is thrown twice, then find the probability of occurrence of 4 at least once.

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

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

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

D. None of these

**Answer: A**



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4. Probability that a person will develop immunity after vaccination is 0.8. If 8 people are given the vaccine then probability that all develop immunity is

A.  $(0.2)^8$

B.  $(0.8)^8$

C. 1

D.  ${}^8C_6(0.2)^6(0.8)^2$

**Answer: B**



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5. 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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**6.** 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.  $1458 \times 10^{-5}$

B.  $1458 \times 10^{-6}$

C.  $14 \times 10^{-6}$

D.  $8748 \times 10^{-5}$

**Answer: A**



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7. If  $x$  denotes the number of sixes in four consecutive throws of a dice, then  $P(x=4)$  is

A.  $\frac{1}{1296}$

B.  $\frac{4}{6}$

C. 1

D.  $\frac{1295}{1296}$

**Answer: A**



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8. In a box of 10 electric bulbs, two are defective. Two bulbs are selected at random one after the other from the box. The first bulb after selection being put back in the box before making the second selection. The probability that both the bulbs are without defect is

A.  $\frac{9}{25}$

B.  $\frac{16}{25}$

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

D.  $\frac{8}{25}$

**Answer: B**



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9. The probability function of a binomial distribution is

$$P(x) = \binom{6}{x} p^x q^{6-x}, x = 0, 1, 2, \dots, 6.$$

If  $2P(2) = 3P(3)$ , then  $p =$

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

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

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

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

**Answer: A**



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**10.** If  $X$  follows a binomial distribution with parameters  $n = 6$  and  $p$ . If

$$4(P(X = 4)) = P(X = 2), \text{ then } P =$$

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

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

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

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

**Answer: D**



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**11.** 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. 15

B. 14

C. 12

D. 7

**Answer: B**



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**12.** One hundred identical coins, each with probability  $p$ , of showing up heads are tossed once. If  $\theta$

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

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

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

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

**Answer: D**



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

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

B.  $1 - \frac{(2n!)}{(n!)^2}$

C.  $1 - \frac{(2n!)}{(n!)^2} \cdot \frac{1}{4^n}$

D. None of these

**Answer: C**



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**14.** An experiment succeeds twice as often as it fails. The probability that in 4 trials there will

be at least three successes is

A.  $\frac{4}{27}$

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

C.  $\frac{16}{27}$

D.  $\frac{24}{27}$

**Answer: C**



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15. A bag contains 2 white & 4 black balls. A ball is drawn 5 times, each being replaced before another is drawn. The probability that at least 4 of the balls drawn are white is:

A.  $\frac{8}{141}$

B.  $\frac{10}{243}$

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

D.  $\frac{8}{41}$

**Answer: C**



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16. The items produced by a firm are supposed to contain 5% defective items. The probability that a sample of 8 items will contain less than 2 defective items, is

A.  $\frac{27}{20} \left( \frac{19}{20} \right)^7$

B.  $\frac{533}{400} \left( \frac{19}{20} \right)^6$

C.  $\frac{153}{20} \left( \frac{1}{20} \right)^7$

D.  $\frac{35}{16} \left( \frac{1}{20} \right)^6$

**Answer: A**



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**17.** An unbiased die with faces marked 1, 2, 3, 4, 5, and 6 is rolled four times. Out of four face values obtained, the probability that the minimum face value is not less than 2 and the maximum face value is not greater than five is then  $\frac{16}{81}$  b.  $\frac{1}{81}$  c.  $\frac{80}{81}$  d.  $\frac{65}{81}$

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

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

C.  $\frac{80}{81}$

D.  $\frac{65}{81}$

**Answer: A**



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**18.** A die is thrown four times. The probability of getting perfect square in at least one throw is

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

B.  $\frac{65}{81}$

C.  $\frac{23}{81}$

D.  $\frac{58}{81}$

**Answer: B**



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**19.** 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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**20.** A box contains 15 green and 10 yellow balls. If 10 balls are randomly drawn, one-by-one, with replacement, then the variance of

the number of green balls drawn is : (a)  $\frac{12}{5}$

(b) 6 (c) 4 (d)  $\frac{6}{25}$

A.  $\frac{6}{25}$

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

C. 6

D. 4

**Answer: B**



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

A. 1.8

B. 0.18

C. 12.6

D. 1.26

**Answer: D**





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22. If  $X \sim B(n, p)$  with  $n = 10, p = 0.4$ , then

$$E(X^2) =$$

A. 4

B. 2.4

C. 3.6

D. 18.4

**Answer: D**



23. The mean and variance of a binomial distribution are 6 and 4 respectively, then  $n$  is

A. 18

B. 12

C. 10

D. 9

**Answer: A**



24. A r.v.  $X \sim B(n, p)$ . If values of mean and variance of  $X$  are 18 and 12 respectively, then total number of possible values of  $X$  are

A. 54

B. 55

C. 12

D. 18

**Answer: B**



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

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

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

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

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

**Answer: A**



26. The mean and variance of a binomial distribution are 8 and 4 respectively. What is  $P(X = 1)$  equal to ?

A.  $\frac{1}{2^8}$

B.  $\frac{1}{2^{12}}$

C.  $\frac{1}{2^6}$

D.  $\frac{1}{2^4}$

**Answer: B**





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27. 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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28. Let  $X \sim B(n, p)$ , if

$E(X) = 5$ ,  $\text{Var}(X) = 2.5$  then  $p(X < 1) =$

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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29. If  $X$  is a binomial variate with mean 6 and variance 2, then the value of  $P(5 \leq X \leq 7)$  is

A.  $\frac{4762}{6561}$

B.  $\frac{4672}{6561}$

C.  $\frac{5264}{6561}$

D.  $\frac{5462}{6651}$

**Answer: B**



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**30.** In a binomial distribution the probability of getting a success is  $\frac{1}{4}$  and standard deviation is 3, then its mean is

A. 6

B. 8

C. 12

D. 10

**Answer: C**



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## Evaluation Test

1. A rifleman is firing at a distance target and hence has only 10% chance of hitting it. Find the number of rounds; he must fire in order to have more than 50% chance of hitting it at least once.

A. 5

B. 7

C. 9

D. 11

**Answer: B**



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2. For a binomial variable  $X$  if  $n=5$  and

$P(X=1)=8P(X=3)$ , then  $p=$

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

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

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

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

**Answer: B**



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**3.** If in a binomial distribution

$n = 4$ ,  $P(X = 0) = \frac{16}{81}$ , 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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4. A die is thrown 100 times. If 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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5. 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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**6.** Consider 5 independent Bernoulli's trials each with probability of success  $p$ . If the probability of at least one failure is greater

than or equal to  $\frac{31}{32}$ , then  $p$  lies in the interval : (1)  $\left(\frac{1}{2}, \frac{3}{4}\right]$  (2)  $\left(\frac{3}{4}, \frac{11}{12}\right]$  (3)  $\left[0, \frac{1}{2}\right]$   
(4)  $\left(\frac{11}{12}, 1\right]$

A.  $\left(\frac{1}{2}, \frac{3}{4}\right]$

B.  $\left(\frac{3}{4}, \frac{11}{12}\right]$

C.  $\left[0, \frac{1}{2}\right]$

D.  $\left(\frac{11}{12}, 1\right]$

**Answer: C**



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7. A coin is tossed 3 times by 2 persons. The probability that both get equal number of heads, is

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

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

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

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

**Answer: C**



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

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

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

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

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

C.  $\frac{9}{\log_{19} 4 - \log_{10} 3}$

D.  $\frac{4}{\log_{19} 4 - \log_{10} 3}$

**Answer: A**



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9. The sum of of the mean and variance of a binomial distribution is 15 and the sum of their squares is 117. the mean of the distribution is

A. 6

B. 9

C. 3

D. 12

**Answer: B**



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**10.** Let  $X$  denote the number of times heads occur in  $n$  tosses of a fair coin. If  $P(X = 4)$ ,  $P(X = 5)$  and  $P(X = 6)$  are in AP; the value of  $n$  is 7, 14 b. 10, 14 c. 12, 7 d. 14, 12

**A. 7,14**

B. 10,14

C. 12,7

D. 14,12

**Answer: A**



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**11.** 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.  $\frac{400}{729}$

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

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

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

**Answer: B**



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**12.** The mean and variance of a binomial distribution  $(p + q)^n$  are 20 and 16 respectively. Then, the pair  $(n, p)$  is

A.  $\left(50, \frac{1}{5}\right)$

B.  $\left(50, \frac{2}{5}\right)$

C.  $\left(100, \frac{1}{5}\right)$

D.  $\left(100, \frac{2}{5}\right)$

**Answer: C**



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