



## MATHS

### BOOKS - NIKITA MATHS (HINGLISH)

### BINOMIAL DISTRIBUTION

#### Mcqs

1. For  $X \sim B(n, p)$ , which of the following is correct ?

A.  $E(X) = \text{Var}(X)$

B.  $E(X) = 2\text{Var}(X)$

C.  $E(X) > \text{Var}(X)$

$$D. E(X) < \text{Var}(X)$$

**Answer: C**



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**2. Given  $X \sim B(n, P)$**

If  $n = 10$  and  $p = 0.4$ , find  $E(X)$  and  $\text{Var}(X)$ .

A. 0.4

B. 2.4

C. 4

D. 24

**Answer: C**



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**3. Given  $X \sim B(n, P)$**

If  $n = 10$  and  $p = 0.4$ , find  $E(X)$  and  $\text{Var}(X)$ .

A. 0.4

B. 24

C. 4

D. 2.4

**Answer: D**



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4. Given  $X \sim B(n, p)$  If  $p = 0.6$   $E(X) = 6$ , find  $n$  and  $\text{Var}(X)$

A. 10

B. 5

C. 8

D. 7

**Answer: A**



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5. Given  $X \sim B(n, p)$  if  $p = 0.6$   $E(X) = 6$ , then the value of  $\text{Var}(X)$  is

A. 24

B. 2.4

C. 6

D. 6.6

**Answer: B**



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6. Given  $X \sim B(n, p)$ . If  $n = 25$ ,  $E(x) = 10$ , find  $p$  and S.D (X)

A. 0.4

B. 0.6

C. 0.3

D. 0.7

**Answer: A**



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7. Given  $X \sim B(n,p)$  . If  $n = 25$  ,  $E(x) = 10$ , find  $p$  and S.D (X)

A.  $2\sqrt{6}$

B.  $\sqrt{6}$

C.  $2\sqrt{10}$

D. 6

**Answer: B**



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**8.** Given  $X \sim B(n, p)$ . If  $E(X) = 6$ , and  $\text{Var}(X) = 4.2$ , find the value of  $n$ .

A. 40

B. 10

C. 20

D. 15

**Answer: C**



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9. Given  $X \sim B(n, p)$  if  $E(X) = 6$ ,  $\text{Var}(X) = 4.2$ , find the value of  $n$  and  $p$ .

A. 0.6

B. 0.4

C. 0.7

D. 0.3

**Answer: D**



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10. For  $X \sim B(n, p)$ , if  $E(X) = 18$ ,  $\text{Var}(X) = 12$ , then  $p =$

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

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

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

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

**Answer: A**



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11. For  $X \sim B(n, p)$ , if  $E(X) = 18$ ,  $\text{Var}(X) = 12$ , then  $q =$

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

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

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

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

**Answer: B**



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12. 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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**13.** Let  $X \sim B(n, P)$ . If  $E(X) = 5$  and  $\text{Var}(x) = 2.5$  find  $n$  and

$p$

A. 5

B. 10

C. 50

D. 2

**Answer: B**



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**14.** For  $X \sim B(n, p)$ , if  $E(X) = 5$ ,  $\text{Var}(X) = 2.5$ , then  $p =$

A. 0.1

B. 0.2

C. 0.5

D. 0.6

**Answer: C**



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15. For  $X \sim B(n, p)$  and  $E(X) = 12$ ,  $\text{Var}(X) = 4$ , then the value of  $n$  is

A. 3

B. 48

C. 18

D. 36

**Answer: C**



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16. Given that  $X \sim B(n=10, p)$ . If  $E(x) = 8$ , find the value of  $p$ .

A. 0.6

B. 0.7

C. 0.8

D. 0.4

**Answer: C**



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17. For  $X \sim B(n, p)$ ,  $n = 10$ ,  $E(X) = 5$ , then  $p =$

A. 0.01

B. 0.1

C. 0.05

D. 0.5

**Answer: D**



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**18.** For  $X \sim B(n, p)$ ,  $n = 10$ ,  $E(X) = 5$ , then  $\text{Var}(X) =$

A. 2.5

B. 25

C. 0.5

D. 50

**Answer: A**



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**19.** For  $X \sim B(n = 10, p = 0.2)$ ,  $P(X=1) =$

A.  $2 \times (0.8)^9$

B.  $2 \times (0.8)^8$

C.  $(0.8)^9$

D.  $(0.8)^8$

**Answer: A**





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20. For  $X \sim B(n = 10, p = 0.2)$ ,  $P(X \geq 1) =$

A.  $1 - (0.8)^9$

B.  $1 - (0.8)^{10}$

C.  $1 - (0.2)^9$

D.  $1 - (0.2)^{10}$

**Answer: B**



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21. For  $X \sim B(n = 10, p = 0.2)$ ,  $P(X \leq 8) =$

A.  $1 - (8.2)(0.2)^8$

B.  $1 - (4.1)(0.2)^8$

C.  $1 - (8.2)(0.2)^9$

D.  $1 - (4.1)(0.2)^{10}$

**Answer: C**



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22. For  $X \sim B(n = 8, p = 0.5)$ ,  $P(|X - 2| \leq 2) =$

A.  $(163)(0.5)^9$

B.  $(163)(0.5)^8$

C.  $(81)(0.5)^7$

D.  $(163)(0.5)^7$

**Answer: B**



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23. 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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**24.** Let  $X \sim B(n, p)$ , if  $E(X) = 5$ ,  $\text{Var}(X) = 2.5$ , then

$P(X < 1)$  is

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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25. Let the p,m f. of r.v X be d

$$p(x) = \binom{4}{x} \left(\frac{5}{9}\right)^x \left(\frac{4}{9}\right)^{4-x}, x= 0,1,2,3,4.$$

A. 22.4

B. 22.2

C. 2.24

D. 2.22

**Answer: D**



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26. Let the p,m f. of r.v X be d

$$p(x) = \binom{4}{x} \left(\frac{5}{9}\right)^x \left(\frac{4}{9}\right)^{4-x}, x= 0,1,2,3,4.$$

A. 0.9876

B. 0.09876

C. 0.9786

D. 0.9786

**Answer: A**



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27. For  $X \sim B(n, p)$ , if  $n = 5$  and the sum of the mean and variance is 1.8, then  $p =$

A. 0.2

B. 0.8

C. 0.3

D. 0.7

**Answer: A**



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28. Each of five questions on a multiple choice examination has four choices, only one of which is correct. A student is attempting to guess the answer. If the random variable  $X$  is the number of questions answered correctly, the probability that the student will get exactly three answers correct is

A.  $\frac{45}{512}$

B.  $\frac{63}{64}$

C.  $\frac{781}{1024}$

D.  $\frac{979}{1024}$

**Answer: A**



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29. Each of five questions on a multiple choice examination has four choices, only one of which is correct. A student is attempting to guess the answer. If the random variable  $X$  is the number of questions answered correctly, the probability that the student will get at most three answers correct is

A.  $\frac{45}{512}$

B.  $\frac{63}{64}$

C.  $\frac{781}{1024}$

D.  $\frac{979}{1024}$

**Answer: B**



30. Each of the total five questions in a multiple choice examination has four choices, only one of which is correct. A student is attempting to guess the answer. The random variable  $X$  is the number of questions answered correctly. What is the probability that the student will give at least one correct answer?

A.  $\frac{45}{512}$

B.  $\frac{63}{64}$

C.  $\frac{781}{1024}$

D.  $\frac{979}{1024}$

Answer: C



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

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

Answer: B



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32. If  $n$  toys are distributed among  $N$  boys randomly, then the probability that a particular boy gets  $r$  ( $< n$ ) toys is

A.  ${}^n C_r \left( \frac{1}{N} \right)^{n-r}$

B.  ${}^n C_r \left( \frac{1}{N} \right)^r$

C.  ${}^n C_r \left( \frac{1}{N} \right)^r \left( 1 - \frac{1}{N} \right)^{n-r}$

D.  ${}^n C_r \left( \frac{1}{N} \right)^r \left( \frac{1}{N} - 1 \right)^{n-r}$

**Answer: C**



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33. The centres for disease control have determined that when a person is given will develop immunity to virus is 0.8 If eight people are given this vaccine find the probability that

- (1) none will develop immunity
- (2) exactly four will develop immunity .
- (3) all will develop immunity ,

A. 0.000128

B. 1.28E-5

C. 2.56E-5

D. 2.56E-6

**Answer: D**





34. The centres for disease control have determined that when a person is given a vaccine, the probability that the person will develop immunity to a virus is 0.8. If eight people are given this vaccine, then the probability that exactly four will develop immunity is

A. 0.04587

B. 0.4587

C. 0.09174

D. 0.9174

**Answer: A**

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

A.  $(0.2)^8$

B.  $(0.8)^8$

C.  $(0.8)^6(0.2)^2$

D.  $(0.8)^2(0.2)^6$

**Answer: B**

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**36.** It is possible for a computer to pick up an erroneous signal that does not show up as an error on the screen. The error is called a silent error. A particular terminal is defective and when while using the system 'word processor', it introduces a silent paging error with probability 0.1. The word processor is used 20 times during a given week. The probabillity that no silent paging error occur

A.  $(0.9)^{20}$

B.  $(0.09)^{20}$

C.  $20(0.9)^{20}$

D.  $20(0.09)^{20}$



**Answer: A**



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37. It is possible for a computer to pick up an erroneous signal that does not show up as an error on the screen. The error is called a silent error. A particular terminal is defective and when while using the system 'word processor', it introduces a silent paging error with probability 0.1. The word processor is used 20 times during a given week. The probability that no silent error occur

A.  $1 - (0.9)^{18}$

B.  $1 - (0.9)^{20}$

C.  $1 - (0.09)^{18}$

D.  $1 - (0.09)^{20}$

**Answer: B**



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**38.** In an experiment, a fair coin is tossed three times. If success means getting two heads, then the probability of no success when experiment is repeated thrice, is

A.  $\left(\frac{1}{8}\right)^3$

B.  $\left(\frac{7}{8}\right)^3$

C.  $\left(\frac{3}{8}\right)^3$

D.  $\left(\frac{5}{8}\right)^3$

**Answer: D**



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**39.** Five fair coins are tossed simultaneously. If the probability of getting at most  $n$  heads is 0.5, then  $n =$

A. 1

B. 2

C. 3

D. 4

**Answer: B**



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**40.** Five fair coins are tossed 8 times, then the probability that it shows heads exactly 5 times is

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

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

C.  $\frac{7}{32}$

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

**Answer: C**



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41. If a fair coin is tossed 8 times, then the probability that it shows heads larger number of times than tails is

A.  $\frac{31}{128}$

B.  $\frac{93}{128}$

C.  $\frac{31}{256}$

D.  $\frac{93}{256}$

**Answer: D**



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42. If a fair coin is tossed 8 times , then the probability that it shows heads at least once is

A.  $\frac{255}{256}$

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

C.  $\frac{85}{256}$

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

**Answer: A**



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43. A fair coin is tossed 9 times . Find the probability that it shows heads exactly 5 times .

A.  $\frac{21}{256}$

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

C.  $\frac{1}{512}$

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

**Answer: B**



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**44.** A fair coin is tossed 9 times. The probability that it shows heads in the first four tosses and tails in the last five tosses is

A.  $\frac{21}{256}$

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

C.  $\frac{1}{512}$

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

**Answer: C**



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45. Two dice are thrown three times. The probability of throwing doublets not more than twice is

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

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

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

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

**Answer: A**



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**46.** The probability that a person who undergoes a kidney operation will recover is 0.7. If the six patients who undergoes similar operations, then the probability that none will recover is

A. 0.00729

B. 0.729

C.  $7.29E-5$

D. 0.000729

**Answer: D**



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47. The probability that a person who undergoes a kidney operation will recover is 0.7. If the six patients who undergoes similar operations, then the probability that all will recover is

A.  $(0.7)^6$

B.  $(0.7)^3$

C.  $(0.7)^6(0.3)^6$

D.  $(0.7)^3(0.3)^6$

**Answer: A**



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**48.** The probability that a person who undergoes a kidney operation will recover is 0.7. If the six patients who undergoes similar operations, then the probability that half of them will recover is

A. 0.01852

B. 0.1852

C. 0.03704

D. 0.3704

**Answer: B**



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49. The probability that a person who undergoes a kidney operation will recover is 0.7. If the six patients who undergoes similar operations, then the probability that at least half will recover is

- A. 0.4648
- B. 0.04648
- C. 0.9296
- D. 0.09296

**Answer: C**



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50. The probability of hitting a target in any shot is 0.2. If 10 shots are fired, find the probability that the target will be hit at least twice. [ Given:  $(0.8)^9 = 0.1342$  ]

- A. 0.3121
- B. 0.6242
- C. 0.4061
- D. 0.8121

**Answer: B**



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51. The probability that a bomb will hit a target is 0.8.

The probability that out of 10 bombs dropped, exactly 2 will miss the target is

A.  $(0.9)(0.8)^{10}$

B.  $(0.9)(0.8)^8$

C.  $(1.8)(0.8)^{10}$

D.  $(1.8)(0.8)^8$

**Answer: D**



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52. The probability that a bomb will miss a target is 0.2.

The probability that out of 5 bombs dropped, exactly 4 will hit the target is

A.  $(0.8)^5$

B.  $(0.2)(0.8)^5$

C.  $(0.8)^4$

D.  $(0.2)(0.8)^4$

**Answer: C**



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**53.** Suppose that 80 % of all families own a television set. If 10 families are interviewed at random, find the probability that seven families own a television set .

A. 0.426

B. 0.04026

C. 0.2013

D. 0.02013

**Answer: C**



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54. 80% of all families own a television set. If 10 families are interviewed at random, then the probability that at most three families own a television set is

A.  $(8401)(0.8)^{10}$

B.  $(8401)(0.2)^{10}$

C.  $(8441)(0.8)^{10}$

D.  $(8441)(0.2)^{10}$

**Answer: D**



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55. 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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56. A machine has fourteen identical components that function independently. It will stop working if three or more components fail. If the probability that a component fails is equal to 0.1, then the probability that the machine will be working is

A.  $\frac{(298)(9)^{12}}{(10)^{14}}$

B.  $\frac{(149)(9)^{12}}{(10)^{14}}$

C.  $(298) \left(\frac{9}{10}\right)^{12}$

D.  $(298) \left(\frac{9}{10}\right)^{14}$

**Answer: A**



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57. 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.  $2 \times 10^{-8}$

B.  $10^{-6}$

C.  $10^{-8}$

D.  $2 \times 10^{-6}$

**Answer: C**



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58. A radar complex consists of eight units that operate independently. The probability that a unit detects an incoming missile is 0.9. The probability that an incoming missile will not be detected by at most four units is

- A. 0.005244
- B. 0.050244
- C. 0.0005244
- D. 0.0050244

**Answer: D**



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59. The probability that a person picked at random will support a constitutional amendment requiring an annual balanced budget is 0.8. If nine individuals are interviewed and they respond independently, then the probability that at least two thirds of them will support the amendment is

A.  $\frac{(218)(4)^6}{(5)^9}$

B.  $\frac{(436)(4)^6}{(5)^9}$

C.  $(436) \left(\frac{4}{5}\right)^6$

D.  $(436) \left(\frac{4}{5}\right)^9$

**Answer: B**



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60. Probability of guessing correctly atleast 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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61. A student is given a quiz with 10 true or false question, and he answers by sheer guessing. If  $X$  is the number of question answered correctly. If the student passes the quiz by getting 7 or maximum correct answer, then the probability that the student passes the quiz is

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

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

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

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

**Answer: C**



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**62.** A student has appeared for an examination. There are 20 question in the paper, with four multiple answer. If he answers correctly he gets 4 marks and if the answer is wrong he gets - 1 mark. A Student will pass in the examination if he gets 50% of the marks.If a student answers by sheer guessing, then the probability that he will pass in the examination is

A.

$${}^{20}C_{12} \frac{3^8}{4^{20}} + {}^{20}C_{13} \frac{3^7}{4^{20}} + \dots + {}^{20}C_{19} \frac{3}{4^{20}} + {}^{20}C_{20} \frac{1}{4^{20}}$$

B.

$${}^{20}C_{12} \frac{1}{4^{20}} + {}^{20}C_{13} \frac{3}{4^{20}} + \dots + {}^{20}C_{19} \frac{3^7}{4^{20}} + {}^{20}C_{20} \frac{3^8}{4^{20}}$$

$$C. \left( {}^{20}C_{12} + {}^{20}C_{13} + \dots + {}^{20}C_{19} + {}^{20}C_{20} \right) \left( \frac{1}{4} \right)^{20}$$

$$D. \left( {}^{20}C_{12} + {}^{20}C_{13} + \dots + {}^{20}C_{19} + {}^{20}C_{20} \right) \left( \frac{3}{4} \right)^{20}$$

**Answer: A**



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**63.** 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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**64.** A rat maze consists of a straight corridor, at the end of which the rats take either right or left turn. If 10 rats are placed in the maze one at a time and the random variable  $X$  denotes the number of right turns taken by the rats, then the probability that at least 9 rats will turn the same way is

A.  $\frac{45}{2^{10}}$

B.  $\frac{45}{2^9}$

C.  $\frac{11}{2^{10}}$

D.  $\frac{11}{2^9}$

**Answer: C**



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**65.** The probability that a lamp in a class room will be burn out is 0.3. Six such lamps are fitted in the class room. It is known that the class room is unusable if the number of lamps burning in it is less than four, then probability that the class room cannot be used on a random occasion is

A. 0.9245

B. 0.9259

C. 0.09245

D. 0.09259

**Answer: A**



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**66.** Let A be the event that a family has children of both sexes. If each family has  $n$  children and the probability that each child being a boy is 0.5, then

A.  $(2)^{1-n}$

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

C.  $1 - (2)^{1-n}$

D.  $1 - (2)^{n-1}$

**Answer: C**



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**67.** A large chain retailer purchase certain Kind of electronic device from a manufacture. The manufacture indicates that the defective rate of the device is 3%. The inspector of the retailer picks 20 items from a shipment. The probability that there will be at least one defective item among these 20 is

A.  $1 + \left(\frac{97}{100}\right)^{20}$

B.  $1 + 3\left(\frac{97}{100}\right)^{20}$

C.  $1 - \left(\frac{97}{100}\right)^{20}$

D.  $1 - 3\left(\frac{97}{100}\right)^{20}$

**Answer: C**



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**68.** A lot of 100 items contains 10 defective items. Five items selected at random from the lot and sent to the retail store. The probability that the store will receive at most one defective item is

A. 0.91845



B. 0.91854

C. 0.091845

D. 0.091854

**Answer: B**



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**69.** From a box containing 20 tickets marked with numbers 1 to 20, four tickets are drawn one by one. After each draw, the ticket is replaced. The probability that the largest value of tickets drawn is 15 is.

A.  $\frac{27}{320}$

B.  $\frac{27}{80}$

C.  $\frac{9}{320}$

D.  $\frac{9}{80}$

**Answer: A**



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**70.** The probability that a certain kind of component will survive a check test is 0.6 Find the probability that exactly 2 of the next 4 rested componentws suvive.

A. 0.03465

B. 0.03456

C. 0.3465

D. 0.3456

**Answer: D**



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71. Suppose that airplane engines operate independently and fail with probability equal to 0.4. Assuming that a plane makes a safe flight if at least on half of its engines run, then the probability for a successful flight of 4-engine plane is

A. 0.8400

B. 0.8408

C. 0.8200

D. 0.8208

**Answer: D**



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72. Suppose that airplane engines operate independently and fail with probability equal to 0.4. Assuming that a plane makes a safe flight if at least on half of its engines run, then the probability for a successful flight of 4-engine plane is

A. 0.8400

B. 0.8408

C. 0.8200

D. 0.8208

**Answer: A**



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**73.** Suppose that airplane operate indenpendently and fail with probabilitly equal to 0.4. Assuming that a plane makes a safe flight if at least one half of its engines run, then

A.  $P(2 \text{ engine plane}) < P(4 \text{ engine plane})$

B.  $P(2 \text{ engine plane}) > P(4 \text{ engine plane})$

C.  $P(2 \text{ engine plane}) = P(4 \text{ engine plane})$

D.  $P(2 \text{ engine plane}) = 2P(4 \text{ engine plane})$

**Answer: B**



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**74.** An insurance agent insures lives of 5 men, all of the same age and in good health. The probability that a man of this age will survive the next 30 years is known to be  $\frac{2}{3}$ . The probability that in the next 30 years at most three men will survive is

A.  $\frac{131}{243}$

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

C.  $\frac{32}{243}$

D.  $\frac{163}{243}$

**Answer: A**



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**75.** If the probability that a fulurorescent light has a useful life of a least 800 hours is 0.9 find the probability that among 20 such lights at least 2 will not have a useful life of at least 800 hours. [ Given  $(0.9)^{20} = 0.1348$ ]

A.  $1 - (2.9)(0.9)^{20}$

B.  $1 - (0.9)(2.9)^{20}$

C.  $1 - (2.9)(0.9)^{19}$

D.  $1 - (2.9)(0.9)^{19}$

**Answer: C**



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76. probability that a person will develop immunity after vaccination is 0.8. If 8 people are given the vaccine, then the probability that all will 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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77. 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: (1)  $\frac{6}{25}$  (2)  $\frac{12}{5}$  (3) 6 (4)  $\frac{6}{5}$

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

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

C. 6

D. 4

**Answer: B**



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