probability and Statistics Assignment

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sec : 13

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1. (a)
2. (c)
3. (c)
4. (a)
5. (c)
6. (b)
7. (b)
8. (c)
9. (c)
10. (b)

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11. (D)

Total number of cases = 6 (1,2,3,4,5,6) There are three even numbers 2,4,6 2 Therefore probability of getting an even number is:

P (even) = 3/6

⇒ P (even) = ½

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12. (B)

Since two coins are tossed, therefore total number of

cases = 22 = 4

Therefore, probability of getting heads in both coins is:

∴ P (head) = ¼

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13. (C)

Total cases = 36

Total cases in which sum of 9 can be obtained are:

(5, 4), (4, 5), (6, 3), (3, 6)

∴ P (9) = 4/36 = 1/9

.14 (C)

Total prime numbers from 1 to 100 are:

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73,

79, 83, 89, 97

3

That means 25 out of 100

So probability is:

P (prime) = 25/100

⇒ P (prime) = ¼

.15 (B)

Let the number of blue balls be x

Then total number of balls will be 5 + x.

According to question,

$x/(5 + x) = 2 \times (5/5+x)$

$\Rightarrow x = 10$

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16. (B)

P (non-defective bulb) = 1 – P (Defective bulb)

= 1 – (12/600)

= (600 – 12)/600

= 588/600

= 147/150

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17. (B)

The perfect square numbers between 2 to 101 are:

1, 4, 9, 16, 25, 36, 49, 64, 81, 100

Total numbers from 2 to 101 =100

So probability of getting a card with perfect square number is:

P (perfect square) = 10/100

$\Rightarrow$ P (perfect square) = 1/10

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18. (C)

With 366 days, the number of weeks in a year is

366/7 = 52 (2/7)

i.e., 52 complete weeks which contains 52 Mondays,

Now 2 days of the year are remaining.

These two days can be

(Sunday, Monday), (Monday, Tuesday), (Tuesday, Wednesday),

(Wednesday, Thursday), (Thursday, Friday), (Friday, Saturday),

(Saturday, Sunday)

i.e., there are 7 pairs, in which Monday occurs in 2 pairs,

5

So probability is: P (53 Monday) = 2/7

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19. (A)

There are total 4 kings in 52 cards, 2 of red colour and 2

of black colour

Therefore, Probability of getting a king of red suit is:

P (King of red suit) = 2/52

⇒ P (King of red suit) = 1/26

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20. (A)

The odd numbers in 1,2,3……..12 are:

1,3,5,7,9,11

Therefore probability that an odd number will come is:

P (odd number) = 6/12 ⇒ P (odd number) = ½

.21 (A)

Total outcomes are:

HHH, HHT, HTH, THH, HTT, THT, TTH, TTT

Favourable outcomes for losing game are

6

HHT, HTH, THH, HTT, THT, TTH

Therefore probability of losing the game is:

P (Losing the game) = 6/8

⇒ P (Losing the game) = ¾

.22 (C)

Riya may have any one of 365 days of the year as her birthday.

Similarly Kajal may have any one of 365days as her birthday.

Total number of ways in which Riya and Kajal may have their birthday

are: 365 × 365

Then Riya and Kajal may have same birthday on any one of 365 days.

Therefore number of ways in which Riya and Kajal may have same

birthday are:

= 365/365 X 365

= 1/365

.23 (C)

We have 5 numbers −2,−1,0,1,2

Whose squares are 4,1,0,1,4

So square of 3 numbers is less than 2

7

Therefore Probability is:

P (x2 < 2) = 3/5

.24 (C)

Let the number of white marbles be x.

Since only two colour marbles are present, and total probability we

know of all the events is equal to 1.

P (white) = 1 – P (red)

x/24 = 1 – (2/3)

⇒ x/24 = 1/3

⇒ x = 8 So there are 8 white marbles

.25 (D)

The numbers that are multiple of 3(from first 50 natural

numbers) are:

3, 6, 9, 12, 15, 18………………..48

The numbers that are multiple of 4 (from first 50 natural numbers)

are:

4, 8, 12, 16…………………….48

The numbers that are multiples of 3 and 4 both are the multiples of

3×4=12 as both 3 and 4 are co-prime.

So common multiples are: 12, 24, 36, 48

8

Therefore probability is:

P (multiple of 3 and 4) = 4/50

⇒ P (multiple of 3 and 4) = 2/25

.26 (D)

P (n) is proportional to n

where n=1,2,3,…6 is random variable.

P(n) = kn

P(1)+P(2)….P (6) = 1

K(1+2+3+4+5+6) = 1

K=

1

21

Hence P(4) = 4K =21/4

.27(A)

The mean of 5 innings is

(50+70+82+93+20)÷5 = 63

S.D = [1⁄n (x(n)-mean)2]0.5

S.D = 25.79

28.(b)

Arranging the terms in ascending order 4, 5, 9, 11, 13, 14,

15, 18, 18.

Median is (n+1)/2 term as n = 9 (odd) = 13.

Mode = 18 which is repeated twice

29.(a)

p=0.5 (Probability of tail)

q=1-0.5=0.5

n=4 and x is binomial variate.

P (X=x) = nCx px qn-x.

P (X=3) = 4C3 (0.5)3 = 1⁄2

30.(d)

Integrating f(x) = x2

from 0 to 3 we get E(X2) = 32 = 9

31.(d)

Var(X) = 0.2, Var(Y) = 0.5

$Z = 5X – 2Y$

$Var(Z) = Var(5X-2Y)$

$= Var(5X) + Var(2Y)$

$= 25Var(X) + 4Var(Y)$

$Var(Z) = 7$

32.(d)

In probability P(x) is always greater than or equal to

Zero

33.(a)

$E(z – x) = E(z) – E(x)$

$= 4 – 2 = 2$

34.(b)

Two random variables are said to be independent if their

covariance is zero

35.(c)

$\Sigma P(x) = k2 – 8 = 1$

On solving, we get $k = 3$

36.(d)

$E(x) = x\ P(x) = 0.5 * 4 = 2$

37.(c)

It is based on the basic axiom of probability

distribution.

38.(a)

$p = 0.4$

$q = 1-p$

$= 1-0.4 = 0.6$

Therefore, mean = p = 0.4 and

Variance = pq = (0.4) (0.6) = 0.24

39.(b)

Here, p = 60% = 0.6 and q = 1-p = 40% = 0.4 and n = 10

Therefore, mean = np = 6

Variance = npq = (10)(0.6)(0.4)

= 2.4

40.(b)

$p = 1/2$

n = 8

11

q = 1⁄2

Therefore, mean = np = 8 * 1⁄2 = 4

41.(a)

The mean and variance for the standard normal

distribution is 0 and 1 respectively

42.(c)

Variance of a random variable is nothing but the

expectation of the square of the random variable subtracted by the

expectation of X (mean of X) to the power 2. Therefore the variance

is given by E(X2) – (E(X))2

43.(a)

Mean is defined as the sum of the function in its domain

multiplied with the random variable’s value. Hence mean is given by

E(X) where X is a random variable

44.(b)

Let f(x) be the pdf of the random variable X.

Now, E(a) = ∫af(x)

= a∫f(x)

= a(1) = a

45.(a)

V(a) = E(a2) – (E(X))2

= a2 – a2

= 0

46.(a)

E(X)=∑f(x)=0(1/9)+1(2/9)+2(3/9)+3(2/9)+4(1/9)

= 2

Variance =E(X2)−(E(X))2=(0+2/9+12/9+18/9+16/9)–4

=4/3

47.(b)

E(X)=0(1/6)+1(2/6)+2(2/6)+3(1/6)=1.5

48.(b)

For a discrete probability function, the

variance is given by Variance (V)= ∑ x

2p(x)

n

x=0

$- \mu$

2

Where μ is the mean, substitute P(x)=nCx px q(n-x) in the above

equation and put μ = np to obtain V = npq

49.(b)

It is the formula for Binomial Distribution that is asked

here which is given by P(X = x) = nCx px q(n-x)

50.(d)

The variance (V) for a Binomial Distribution is given by V

= npq

Standard Deviation = √var=√npq
