|  |  |
| --- | --- |
| Activity | Data Type |
| Number of beatings from Wife | **Discrete** |
| Results of rolling a dice | **Discrete** |
| Weight of a person | **Continuous** |
| Weight of Gold | **Continuous** |
| Distance between two places | **Continuous** |
| Length of a leaf | **Continuous** |
| Dog's weight | **Continuous** |
| Blue Color | **Discrete** |
| Number of kids | **Discrete** |
| Number of tickets in Indian railways | **Discrete** |
| Number of times married | **Discrete** |
| Gender (Male or Female) | **Discrete** |

Q1) Identify the Data type for the Following:

Q2) Identify the Data types, which were among the following

Nominal, Ordinal, Interval, Ratio.

|  |  |
| --- | --- |
| Data | Data Type |
| Gender | **Nominal** |
| High School Class Ranking | **Ordinal** |
| Celsius Temperature | **Interval** |
| Weight | **Ratio** |
| Hair Color | **Nominal** |
| Socioeconomic Status | **Ordinal** |
| Fahrenheit Temperature | **Interval** |
| Height | **Ratio** |
| Type of living accommodation | **Ordinal** |
| Level of Agreement | **Ordinal** |
| IQ(Intelligence Scale) | **Interval** |
| Sales Figures | **Interval** |
| Blood Group | **Nominal** |
| Time Of Day | **Interval** |
| Time on a Clock with Hands | **Interval** |
| Number of Children | **Ratio** |
| Religious Preference | **Ordinal** |
| Barometer Pressure | **Interval** |
| SAT Scores | **Interval** |
| Years of Education | **Interval** |

Q3) Three Coins are tossed, find the probability that two heads and one tail are obtained?

* **Total Number of Events = { HHH, THH, HTH, HHT**

**TTT, HTT, THT, TTH}**

**= 8**

**Events = 3**

**Probability = 3/8**

Q4) Two Dice are rolled, find the probability that sum is

1. Equal to 1
2. Less than or equal to 4
3. Sum is divisible by 2 and 3

* **Sample = {(1,1) , (1,2), (1,3), (1,4), (1,5), (1,6)**

**(2,1), (2,2), (2,3), (2,4), (2,5), (2,6)**

**(3,1), (3,2), (3,3), (3,4), (3,5), (3,6)**

**(4,1), (4,2), (4,3), (4,4), (4,5), (4,6)**

**(5,1), (5,2), (5,3), (5,4), (5,5), (5,6)**

**(6,1), (6,2), (6,3), (6,4), (6,5), (6,6)}**

**Outcome = 36**

1. **Equal to 1**

**Probability = 0.**

1. **Less than or equal to 4.**

**Events = (1,1), (1,2), (1,3), (2,1), (2,2), (3,1)**

**Probability = 6/36 = 1/6**

1. **Sum is divisible by 2 and 3.**

**Events = (1,5), (2,4), (3,3), (4,2), (5,1), (6,6)**

**Probability = 6/36**

Q5) A bag contains 2 red, 3 green and 2 blue balls. Two balls are drawn at random. What is the probability that none of the balls drawn is blue?

* **Total No. of balls = (2 + 3 + 2) = 7**

**S be the sample Space**

**Therefore, n(S) = No. of ways of drawing 2 balls out of 7**

**n(S) = 7C2**

**n(S) = ( 7 x 6) / ( 2 x 1) = 42 / 2 = 21**

**E = Event of 2 balls, None of the balls drawn is blue**

**Therefore, n(E)= No. of ways of drawing 2 balls out of (2+3) balls**

**n(E) = 5C2**

**n(E)= (5 x 4) / ( 2 x 1) = 20 / 2 = 10**

**P(E) = n(E)/n(S) = 10/21**

Q6) Calculate the Expected number of candies for a randomly selected child

Below are the probabilities of count of candies for children (ignoring the nature of the child-Generalized view)

|  |  |  |
| --- | --- | --- |
| CHILD | Candies count | Probability |
| A | 1 | 0.015 |
| B | 4 | 0.20 |
| C | 3 | 0.65 |
| D | 5 | 0.005 |
| E | 6 | 0.01 |
| F | 2 | 0.120 |

Child A – probability of having 1 candy = 0.015.

Child B – probability of having 4 candies = 0.20

* **Expected no of candies for a randomly selected child**

**=(1 x 0.015) + (4 x 0.20) + (3 x 0.65) + (5 x 0.005) + (6 x 0.01) + (2 x 0.12)**

**= 0.015 + 0.80 + 1.95 + 0.025 + 0.06 + 0.24 = 3.09**

Q7) Calculate Mean, Median, Mode, Variance, Standard Deviation, Range & comment about the values / draw inferences, for the given dataset

* For Points, Score, Weigh>

Find Mean, Median, Mode, Variance, Standard Deviation, and Range and also Comment about the values/ Draw some inferences.

**Use Q7.csv file**

* **Code file name Q7**

Q8) Calculate Expected Value for the problem below

1. The weights (X) of patients at a clinic (in pounds), are

108, 110, 123, 134, 135, 145, 167, 187, 199

Assume one of the patients is chosen at random. What is the Expected Value of the Weight of that patient?

* **Weight of patients (X) – 108, 110, 123, 134, 145, 167, 187, 199**

**Probability of chosen at random = 1 / 9**

**E(X) – 108, 110, 123, 134, 135, 145, 167, 187, 199**

**Expected Value = ∑ (Probability X E(X))**

**= (108 x (1/9)) + (110 x (1/9)) + (123 x (1/9)) + (134 x (1/9)) + (135 x (1/9)) + (145 x (1/9)) + (167 x (1/9)) + (187 x (1/9)) + (199 x (1/9))**

**= 1/9 x (108 + 110 + 123 + 134 + 135 + 145 + 167 + 187 + 199)**

**= 1/9 X 1308**

**= 145.33**

**Q9) Calculate Skewness, Kurtosis & draw inferences on the following data**

**Cars speed and distance**

**Use Q9\_a.csv**

* **Code file name Q9\_a**

**SP and Weight(WT)**

**Use Q9\_b.csv**

* **Code file name Q9\_b**

**Q10) Draw inferences about the following boxplot & histogram**



* **it shows that the distribution has outliers at the end (means in histogram tail side and in box plot at in upper extreme). The distribution is positive skewed or right skewed.**

**Q11)** Suppose we want to estimate the average weight of an adult male in Mexico. We draw a random sample of 2,000 men from a population of 3,000,000 men and weigh them. We find that the average person in our sample weighs 200 pounds, and the standard deviation of the sample is 30 pounds. Calculate 94%,98%,96% confidence interval?

* **Code file name Q11**

**Q12)** Below are the scores obtained by a student in tests

**34,36,36,38,38,39,39,40,40,41,41,41,41,42,42,45,49,56**

1. Find mean, median, variance, standard deviation.

* **Code file name Q12**

1. What can we say about the student marks?

* **The student score 41 mark most of the time. He scores average 41 mark.**

Q13) What is the nature of skewness when mean, median of data are equal?

* **The Nature of skewness is zero.**

Q14) What is the nature of skewness when mean > median ?

* **The Nature of skewness is Positive or Right Skewed.**

Q15) What is the nature of skewness when median > mean?

* **The Nature of skewness is Negative or Left skewed.**

Q16) What does positive kurtosis value indicates for a data ?

* **The Positive Kurtosis value indicates that a dataset has heavier or fatter tails and a more peaked compared to a normal distribution.**

Q17) What does negative kurtosis value indicates for a data?

* **The negative kurtosis value indicates that dataset has lighter or thinner tails and a flatter compared to a normal distribution.**

Q18) Answer the below questions using the below boxplot visualization.



What can we say about the distribution of the data?

* **The data distributed between 10 to 18.**

What is nature of skewness of the data?

* **The nature of skewness of the data is negative skewness or left skewed.**

What will be the IQR of the data (approximately)?   
 **-> IQR = 8.2 (approx..). 50 % of data lies in between IQR range.**

Q19) Comment on the below Boxplot visualizations?



Draw an Inference from the distribution of data for Boxplot 1 with respect Boxplot 2.

Q 20) Calculate probability from the given dataset for the below cases

Data \_set: Cars.csv

Calculate the probability of MPG of Cars for the below cases.

MPG <- Cars$MPG

* 1. P(MPG>38)
  2. P(MPG<40)

c. P (20<MPG<50)

**-> Code file name Q20**

Q 21) Check whether the data follows normal distribution

1. Check whether the MPG of Cars follows Normal Distribution

Dataset: Cars.csv

* **Code file name Q21\_a**

1. Check Whether the Adipose Tissue (AT) and Waist Circumference(Waist) from wc-at data set follows Normal Distribution

Dataset: wc-at.csv

* **Code file name Q21\_b**

Q 22) Calculate the Z scores of 90% confidence interval,94% confidence interval, 60% confidence interval

* **Code file name Q22**

Q 23) Calculate the t scores of 95% confidence interval, 96% confidence interval, 99% confidence interval for sample size of 25

* **Code file name Q23**

Q 24**)** A Government company claims that an average light bulb lasts 270 days. A researcher randomly selects 18 bulbs for testing. The sampled bulbs last an average of 260 days, with a standard deviation of 90 days. If the CEO's claim were true, what is the probability that 18 randomly selected bulbs would have an average life of no more than 260 days

Hint:

rcode 🡪 pt(tscore,df)

df 🡪 degrees of freedom

* **Population mean, µ = 270**

**Sample size, n = 18**

**Sample mean, x̅ = 260**

**Standard deviation, s = 90**

**T score = (x̅- µ)/(s/sqrt(n))**

**=(260-270)/(90/sqrt(18))**

**= -10/21.23**

**= -0.47**

**df = n – 1 = 18 – 1 =17**

**Code file name Q24**

**Probability**