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

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

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

**Ans-3)** 3/8

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

1. Equal to 1 **=** 0
2. Less than or equal to 4 **=** 1/6
3. Sum is divisible by 2 and 3 **=** 5/36

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?

Ans - 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

Ans - 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

**Ans -**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Points | Score | Weight |
| Mean | 3.596 | 3.217 | 17.848 |
| Median | 3.695 | 3.325 | 17.710 |
| Mode | 3.891 | 3.54 | 17.43 |
| Variance | 0.285 | 0.957 | 3.19 |
| Standard Deviation | 0.534 | 0.978 | 1.786 |
| Range | 2.76,4.93 | 1.513,5.424 | 14.5,22.9 |

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?

**Solution:**

Expected Value = ∑ (probability \* Value)

 ∑ P(x). E(x)

there are 9 patients

Probability of selecting each patient = 1/9

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

P(x) 1/9 1/9   1/9 1/9   1/9   1/9   1/9   1/9 1/9

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

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

= (1/9) (1308)

= 145.33

Expected Value of the Weight of that patient = 145.33

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

Cars speed and distance

Use Q9\_a.csv

**Ans –**

|  |  |  |
| --- | --- | --- |
|  | Cars speed | Distance |
| Skewness | -0.1139548 | 0.7824835 |
| Kurtosis | 2.422853 | 3.248019 |

**SP and Weight(WT)**

**Use Q9\_b.csv**

**Ans –**

|  |  |  |
| --- | --- | --- |
|  | **SP** | **WT** |
| Skewness | 1.581454 | -0.6033099 |
| Kurtosis | 5.723521 | 3.819466 |

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





**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?

Ans –

|  |  |  |
| --- | --- | --- |
| Confidence interval | Z value | Range |
| Confidence interval 94% | 1.880794 | 198.74,201.26 |
| Confidence interval 96% | 2.053749 | 198.62,201.38 |
| Confidence interval 98% | 2.326348 | 198.43,201.56 |

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.

Ans –

|  |  |
| --- | --- |
| Mean | 41 |
| Median | 40.5 |
| Variance | 25.52 |
| Standard Deviation | 5.05664 |

1. What can we say about the student marks?

Ans - Mass of students marks between 38-42.

Skewness (1.52) is positive because mass of marks in left side of plot.

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

Ans - Data is normalized and there is no skewness.

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

 Ans - Negative Skewness implies mass of the Distribution concentrated on right side.

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

Ans - Skewness implies mass of the Distribution concentrated on left side.

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

Ans - Positive kurtosis value indicates that thinner peak and wider tails.

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

Ans - Negative kurtosis value indicates that wider peak and thinner tails.

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



What can we say about the distribution of the data?

Ans - Not normally distributed

What is nature of skewness of the data?

Ans - Negative skewness

What will be the IQR of the data (approximately)?

Ans - -10-18

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)

pnorm (38,34.422,9.13144) = 0.3475908

* 1. P(MPG<40)

pnorm (40,34.422,9.13144) = 0.7293527

* 1. P (20<MPG<50)

pnorm (50,34.422,9.13144) -(1-pnorm (20,34.422,9.13144)) =0.01311818

Q 21) Check whether the data follows normal distribution

1. Check whether the MPG of Cars follows Normal Distribution

Dataset: Cars.csv

Ansa: - Check Jupyter file

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

Dataset: wc-at.csv

Ans: - Check Jupyter file

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

Ansa –

|  |  |
| --- | --- |
| Confidence interval | Z scores |
| 60% | 0.8416212 |
| 90% | 1.644854 |
| 94% | 1.880794 |

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

Ansa –

|  |  |
| --- | --- |
| Confidence interval | T scores |
| 95% | 2.063899 |
| 96% | 2.171545 |
| 99% | 2.796939 |

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

Ans –

52.86%