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

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

1. To get 2 heads and 1 tail, all combinations are: HHH, TTT, HHT, TTH, HTH, THT, HTT, THH

Required ones are: HHT, HTH, THH

P = 3/8 = 0.375

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
4. a) P = 0

b) Required: [(1,1), (1,2), (1,3), (2,1), (2,2), (3,1)]

P = 6/36 = ¼

c)Required: [(1,5), (5,1), (2,4), (4,2), (6,6)] = 5

P = 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?

1. Total number of balls = 10

For 1st draw, not a blue ball = [2(red) + 3(green)]/7

Now only 6 balls remaining

For 2nd draw, not a blue ball = [2(red) + 2(green)]/6

Probability that none of the balls drawn is blue is;

P(1st draw) \* P(2nd Draw) = 5/7 \* 4/6

* 20/42
* 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

1. The expected no of candies for randomly selected child is:

Number of candies \* probability = 1\*0.015 + 4\*0.20 + 3\*0.65 + 5\*0.005 + 6\*0.01 + 2\*0.120 🡪 3.9

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**

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?

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

**Cars speed and distance**

**Use Q9\_a.csv**

**SP and Weight(WT)**

**Use Q9\_b.csv**

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



1. The histogram has a right skew and the tail is on the right side. In this case, Mean>Median.



1. The boxplot has outliers on the maximum side.

**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?

**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.
2. What can we say about the student marks?
3. 1)In notebook

2)Since mean is greater than median, data is slightly right side skewed.

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

1. There is no skewness when mean and median of data are equal.

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

1. It indicates that the distribution is right-skewed or positively skewed. Tail on the right side is fatter or longer than tail on left side.

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

1. It indicates that the distribution is left-skewed or negatively skewed. Tail on the left side is fatter or longer than tail on right side.

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

1. A positive kurtosis value indicates that a dataset has heavier tails and a sharper peak compared to a normal distribution. Dataset has more outliers.

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

1. A negative kurtosis value indicates that a dataset has lighter tails and a flatter peak 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?

1. The median is towards a higher value. The boxplot is not normally distributed.

What is nature of skewness of the data?

1. Data is skewed towards left.

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

1. IQR = Q3 upper quartile – Q1 lower quartile = 18-10= 8.

Q19) Comment on the below Boxplot visualizations?



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

1. Both the boxplots share the same median which is approximately in the range of 250-275. There are no outliers. They are normally distributed with 0 to no skewness.

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)
  3. P (20<MPG<50)

1. In notebook

Q 21) Check whether the data follows normal distribution

1. Check whether the MPG of Cars follows Normal Distribution

Dataset: Cars.csv

1. P value after conducting normality test is 0.279 which is greater than 0.05, so it is normally distributed
2. Check Whether the Adipose Tissue (AT) and Waist Circumference(Waist) from wc-at data set follows Normal Distribution

Dataset: wc-at.csv

1. In notebook

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

A. In Notebook.

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

A. In notebook

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

1. P = 0.3216 or 32.16%