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

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

**Ans:**

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

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,,,5/36
3. Sum is divisible by 2and 3 - 1/6,,,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?

**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

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: in Jupyter note book**

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?

**Ans: 145.33 (in pounds)**

**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**

**Ans: in Jupyter note book**

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



Ans: **Histogram:-**

Chick weight data is right skewed or positively skewed.---- Yes

More than 50% Chick Weight is between 50 to 150. ---- Yes

Most of the chick weight is between 50 to 100. --- Yes

The data is right skewed.

There are outliers at upper 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?

**Ans: 94% -> 200±1.261**

**98% -> 200±1.562**

**96% -> 200±1.375**

**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?

**Ans: in Jupyter note book**

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

Ans: If mean is equal to the median, the nature of skewness of distribution is 0 or normalized.

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

Ans: If the mean is greater than the median, the distribution is positively or right skewed

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

Ans: If the median is greater than the mean, the distribution is negatively or left skewed.

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

Ans: Positive values of kurtosis indicate that **distribution is peaked and possesses thick tails**.

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

Ans: A distribution with a negative kurtosis value indicates that **the distribution has lighter tails than the normal distribution**

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



What can we say about the distribution of the data?

Ans = The data is distributed in De-assigned format.

What is nature of skewness of the data?

Ans = Left side skewed.

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

Ans = Q3-Q1 = 18-10 = 8 is IQR

Q19) Comment on the below Boxplot visualizations?



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

Ans = The box plot 1 designed with range = 3 , The second one range is = 1.5

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

Data \_set: Cars.csv

Calculate the probability of MPG ofCars for the below cases.

MPG<- Cars$MPG

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

c. P (20<MPG<50)

Ans: a) There are 33 observations in MPG which is greater than 38.

1. There are 61 observations MPG which is greater than 40.

Q 21) Check whether the data follows normal distribution

1. Check whether the MPG of Cars follows Normal Distribution

Dataset: Cars.csv

Ans: Yes ,, the MPG of Cars follows Normal Distribution.

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

Dataset: wc-at.csv

Q 22) Calculate the Z scoresof 90% confidence interval,94% confidence interval, 60% confidence interval .

Ans: 90% confidence interval – 1.645

: 94% confidence interval – 1.881

: 60% confidence interval – 0.848

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

Ans: 95% confidence interval –

**Explanation:**

To compute the 95% confidence interval, start by computing the mean and standard error: M = (2 + 3 + 5 + 6 + 9)/5 = 5. σM = = 1.118. Z.95 can be found using the normal distribution calculator and specifying that the shaded area is 0.95 and indicating that you want the area to be between the cutoff points

Confidence Level z

0.90 1.645

0.92 1.75

0.95 1.96

0.96 2.05

With a 90 percent confidence interval, you have a 10 percent chance of being wrong. A 99 percent confidence interval would be wider than a 95 percent confidence interval (for example, plus or minus 4.5 percent instead of 3.5 percent).

: 96% confidence interval –

: 99% confidence interval –

Q 24**)**A Government companyclaims 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:**

**Solution:**

t - statistics for the data is given as follows:

t =

x = mean of the sample of bulbs =  260

μ = population mean = 270

s = standard deviation of the sample = 90

n = number of items in the sample = 18

t = - 0.471

For probability calculations, the number of degrees of freedom is n - 1, so here you need the t-distribution with 17 degrees of freedom.

The probability that **t < - 0.471 with 17 degrees of freedom** assuming the population mean is true, the t-value is less than the t-value obtained With 17 degrees of freedom and a t score of - 0.471, the probability of the bulbs lasting less than 260 days on average of **0.3218** assuming the mean life of the bulbs is 300 days.