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

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

Ans: 3/8 or 0.38

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

Ans: a) 0

b) 1/6 or 1.667

c) 2/3 or 0.667

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 WEIGH**

**MEAN 3.597 3.217 17.85**

**MEADIAN 30.695 3.325 17.71**

**MODE 3.07 / 3.92 3.44 17.02 / 18.90**

**SD 0.98 1.79**

**VARIANCE 0.29 0.96 3.19**

**RANGE 2.17 3.91 8.4**

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

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

**Cars speed and distance**

**Use Q9\_a.csv**

**Ans : SPEED DISTANCE**

**SKEWNESS -0.1105533 0.7591268**

**KURTOSIS 2.422853 3.248019**

**SP and Weight(WT)**

**Use Q9\_b.csv**

**Ans : SP WEIGHT**

**SKEWNESS 1.581454 -0.6033099**

**KURTOSIS -0.6033099 3.819466**

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

**Ans : (i) As it is right skewed and its mean is greater than median**



**(ii)** **Outlier are too many and far from mean , median and mode**



**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: (i) Now for 94% confidence interval

Standard error = 30/sqrt (2000) = 30/44.72 = 0.67

Alpha = 1-(confidence interval)/100 = 1-(0.94) = 0.06

Critical probability = 1-(alpha/2) = 1-(0.06/2) = 0.97

Df = 2000-1 = 1999

Critical value at df = 1999 = 1.881

Margin of error = critical value\*standard error = 1.881\*0.67 = 1.26

Hence 94% confidence interval =(200+1.26,200-1.26)= (201.26,198.74)

(ii) Now for 98% confidence interval

Standard error = 30/sqrt (2000) = 30/44.72 = 0.67

Alpha = 1-(confidence interval)/100 = 1-(0.98) = 0.02

Critical probability = 1-(alpha/2) = 1-(0.02/2) = 0.99

Df = 2000-1 = 1999

Critical value at df = 1999 = 2.33

Margin of error = critical value\*standard error = 2.33\*0.67 = 1.56

Hence 98% confidence interval =(200+1.26,200-1.26)+ (201.56,198.44)

(iii) Now for 96% confidence interval

Standard error = 30/sqrt (2000) = 30/44.72 = 0.67

Alpha = 1-(confidence interval)/100 = 1-(0.96) = 0.04

Critical probability = 1-(alpha/2) = 1-(0.04/2) = 0.98

Df = 2000-1 = 1999

Critical value at df = 1999 = 2.055

Margin of error = critical value\*standard error = 2.055\*0.67 = 1.37

Hence 96% confidence interval =(200+1.37,200-1.37)+ (201.237,198.62)

**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 (i) : MEAN : 41

MEADIAN : 40.5

VARIANCE : 25.53

SD : 5.05

Ans (ii) : Mean is greater than median.

It is right skewed and contains no outlier.

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

Ans : Symmetric

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

Ans : Right skewed

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

Ans : Left skewed

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

Ans : Implied data has a sharp peak and wide tails

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

Ans : Implied data has a sharp peak and thin tail

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



What can we say about the distribution of the data?

1. It is normally distributed

What is nature of skewness of the data?

1. Left skewed

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

1. IQR=Q3-Q1

IQR=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.

Ans : Boxplot 1 and 2 are normally distributed

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

Ans: Mean = 34 and Standard deviation = 9

* 1. P(MPG>38) = 0.35
  2. P(MPG<40) = 0.7

c. P (20<MPG<50) = 0.9

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 data of 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

Ans : Yes wc -at data set is normally distributed

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

Ans : Z score of 90% cf = 1.6

Z score of 94% cf = 1.8

Z score of 60% cf = 0.8

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

Ans : T score of 95% cf = 2.06

T score of 96% cf = 2.1

T score of 99% cf = 2.7

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 : Here N = 18, x = 270, s.d = 90

t = -0.47

df = 17

p = 0.322