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

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

ANS: P(E) = n(E) / n(S) = 3/8

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

1. Equal to 1

ANS: P(E) = n(E) / n(S) = 0/36 = 0

1. Less than or equal to 4

ANS: E = {(1,1) (1,2) (2,1) (1,3) (2,2) (3,1)}

P(E) = n(E) / n(S) = 6/36 = 1/6

1. Sum is divisible by 2 and 3

ANS: E = {(5,1) (4,2) (3,3) (2,4) (1,5) (6,6)}

P(E) = n(E) / n(S) = 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: n(S) = 7C2 = 7x6 = 21

2x1

n(E) = 5C2 = 5x4 = 10

2x1

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

ANS: Expected number 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 + 0.8  + 1.95 + 0.025 + 0.06 + 0.24

=   3.090

=  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: Mean: Median: Mode:

Points => 3.596563 Points => 3.695 Points => 3.07, 3.92

Score => 3.21725 Score => 3.325 Score => 3.44

Weight => 17.84875 Weight => 17.71 Weight => 17.02, 18.90

Standard Deviation: Variance: Range:

Points => 0.5346787 Points => 0.2858814 Points => 2.17

Score => 0.9784574 Score => 0.957379 Score => 3.911

Weight => 1.786943 Weight => 3.193166 Weight => 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: = (1/9) X (1308)

= 145.33

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

**Cars speed and distance**

**Use Q9\_a.csv**

ANS: Skewness: Kurtosis:

Speed=> -0.117510 Speed=> -0.508994

Distance=> 0.806895 Distance=> 0.405053

**SP and Weight(WT)**

**Use Q9\_b.csv**

ANS: Skewness: Kurtosis:

Speed=> 1.611450 Speed=> 2.977329

Distance=> -0.614753 Distance=> 0.950291

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



ANS: This is right skewed Histogram and its skewness is seen to be positive.



ANS: This is a 6 point chart and it is going to give the information about:

Q1, Median value(Q2), Q3, lower limit, Upper Limit and outliers.

**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% = (198.738325292158, 201.261674707842)

98% = (198.43943840429978, 201.56056159570022)

96% = (198.62230334813333, 201.37769665186667)

**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 => 41.0 Variance => 25.52

Median => 40.5 Standard deviation => 5.052

1. What can we say about the student marks?

ANS: Mean is greater than Median

It is right skewed and contains no outliers.

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

ANS: It is perfectly symmetrical. Hence, skewness value will be zero.

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

ANS: It is right skewed. Hence, skewness value will be Positive.

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

ANS: It is left skewed. Hence, skewness value will be Negative.

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

ANS: It indicates that a distribution is peaked and possess thick tails

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

ANS: It indicates that a distribution is flat and has thin tails

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



What can we say about the distribution of the data?

ANS: We can say that there is a big difference between upper quartile and upper extreme compared to the lower quartile and lower extreme.

What is nature of skewness of the data?

ANS: Left Skewed

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

ANS: 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: Medium is same for both graph, there is difference between upper limit and lower limit (IQR1-IQR2) and there is no outliers in both the boxplot.

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)

ANS: 0.652513

* 1. P(MPG<40)

ANS: 0.2705429

* 1. P (20<MPG<50)

ANS: 0.89891777

Q 21) Check whether the data follows normal distribution

1. Check whether the MPG of Cars follows Normal Distribution

Dataset: Cars.csv

ANS: From above plot and values we can say that data is fairly symmetrical, i.e fairly normally distributed.

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

Dataset: wc-at.csv

ANS: From above plot and values of (AT) and (Waist) we can say that data is fairly symmetrical, i.e fairly normally distributed.

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

ANS: Z scores of:

90% = 1.6448536269514722

94% = 1.8807936081512509

60% = 0.8416212335729143

Q 23) Calculate the t scores of 95% confidence interval, 96% confidence interval,

99% confidence interval for sample size of 25

ANS: T-Score:

95% = 2.0638985616280205

96% = 2.1715446760080677

99% = 2.796939504772804

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: t = -0.4714045207910317

Probability: 0.32167411684460556