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

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 | Ordinal |
| Level of Agreement | Ordinal |
| IQ(Intelligence Scale) | Ratio |
| Sales Figures | Interva0l |
| Blood Group | Nominal |
| Time Of Day | Ratio |
| Time on a Clock with Hands | Ratio |
| Number of Children | Ordinal |
| Religious Preference | Nominal |
| Barometer Pressure | Ratio |
| SAT Scores | Ratio |
| Years of Education | Nominal |

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

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

two heads and one tail-3

Total-8

Probability of (two heads and one tail)- 3/8

Ans : 3/8

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

P(A)-{1,2,3,4,5,6}

P(B)-{1,2,3,4,5,6}

**Total:36**

**Equal to 1 -** (1,1) = 0

**Less than or equal to 4**

=

= 6/36

Ans= 1/6

**Sum is divisible by 2 and 3**

= (1,5)(3,3),(4,2),(5,1),(6,6)

Ans =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?

P(A) = 2 red

P(B) = 3 green

P(C) = 2 blue

Total - 7

**Two balls are drawn at random**

The formula for number of different combinations of n distinct objects taken r at a time is c(n,r)=n!/r!(n-r)!

The probability of 7C2 is 7!/2!\*5!= 7\*6\*5\*4\*3\*2\*1 **/** 2\*5\*4\*3\*2\*1 = 7\*6/2=21.

Therefore the probability of 7C2 is 21.

**probability that none of the balls drawn is blue – 5/7**

The probability of 5C2 is 5!/2!\*3! = 5\*4\*3\*2\*1 **/** 2\*3\*2\*1 = 20/2 =10

**Probability of outcome = 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. = > 0.015

Child B – probability of having 4 candies = 0.20 = > 0.8

Calculate the Expected number of candies for a randomly selected child:

= 1\*0.015 + 4\*0.20 + 3\*0.65 +5\*0.005 + 6\*0.01 + 2\*0.12

= 0.015 + 0.8 + 1.95 + 0.025 + 0.06 + 0.24

Ans = 3.09

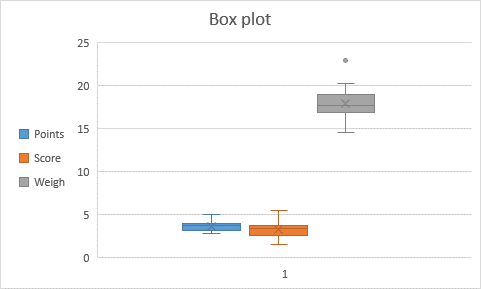
Q7) Calculate Mean, Median, Mode, Variance, Standard Deviation, Range & comment about the values / draw inferences, for the given dataset

* 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**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Points | Score | Weigh |
| Mean | 3.596563 | 3.21725 | 17.84875 |
| Median | 3.695 | 3.325 | 17.71 |
| Mode | 3.9 | 3.44 | 17.02 |
| Variance | 0.285881 | 0.957379 | 3.193166 |
| Standard Deviation | 0.534679 | 0.978457 | 1.786943 |
| Range | 4.93to2.76 | 5.424to1.513 | 22.9to14.5 |
| Range | 2.17 | 3.911 | 8.4 |



|  |  |  |
| --- | --- | --- |
| Points | Score | Weigh |
| 3.9 | 2.62 | 16.46 |
| 3.9 | 2.875 | 17.02 |
| 3.85 | 2.32 | 18.61 |
| 3.08 | 3.215 | 19.44 |
| 3.15 | 3.44 | 17.02 |
| 2.76 | 3.46 | 20.22 |
| 3.21 | 3.57 | 15.84 |
| 3.69 | 3.19 | 20 |
| 3.92 | 3.15 | 22.9 |
| 3.92 | 3.44 | 18.3 |
| 3.92 | 3.44 | 18.9 |
| 3.07 | 4.07 | 17.4 |
| 3.07 | 3.73 | 17.6 |
| 3.07 | 3.78 | 18 |
| 2.93 | 5.25 | 17.98 |
| 3 | 5.424 | 17.82 |
| 3.23 | 5.345 | 17.42 |
| 4.08 | 2.2 | 19.47 |
| 4.93 | 1.615 | 18.52 |
| 4.22 | 1.835 | 19.9 |
| 3.7 | 2.465 | 20.01 |
| 2.76 | 3.52 | 16.87 |
| 3.15 | 3.435 | 17.3 |
| 3.73 | 3.84 | 15.41 |
| 3.08 | 3.845 | 17.05 |
| 4.08 | 1.935 | 18.9 |
| 4.43 | 2.14 | 16.7 |
| 3.77 | 1.513 | 16.9 |
| 4.22 | 3.17 | 14.5 |
| 3.62 | 2.77 | 15.5 |
| 3.54 | 3.57 | 14.6 |
| 4.11 | 2.78 | 18.6 |

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:

Mean

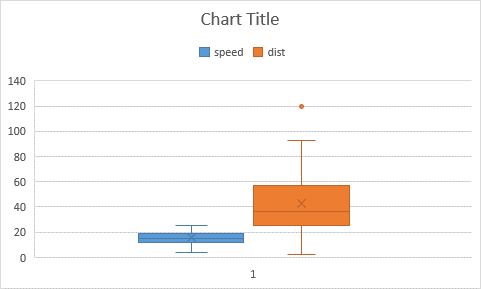
145.3333

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

**Cars speed and distance**

**Use Q9\_a.csv**

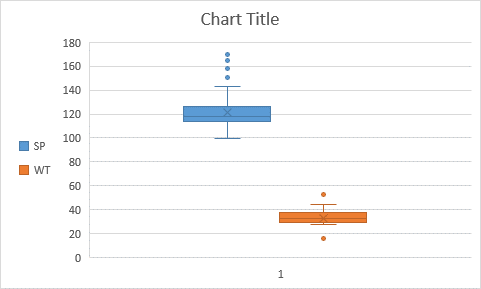
|  |  |  |
| --- | --- | --- |
|  | speed | Dist |
| Skewness | -0.11751 | 0.806895 |
| Kurtosis | -0.50899 | 0.405053 |



**SP and Weight(WT)**

**Use Q9\_b.csv**

|  |  |  |
| --- | --- | --- |
|  | SP | WT |
| Skewness | 1.61145 | -0.61475 |
| Kurtosis | 2.977329 | 0.950291 |



**Q10) Draw inferences about the following boxplot & 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: python code

**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.

Mean = 41 Median = 40.5 variance=25.52941 standard deviation=5.05266

1. What can we say about the student marks?

Ans : avg of student marks is 41

The student marks range from 34-56

Mode is 41

Most of the student score between (36-42)

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

Ans : mean, median of data are equal so no skewness

Data is normal Distribution and there is no skewness

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

If the mean is greater than median, Then the distribution is positive skewed

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

If the mean is lesser than median, Then the distribution is negative skewed

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

Positive kurtosis value indicates that thinner peak and wider tails

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

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?

Not normally distributed

What is nature of skewness of the data?

Negative skewness

What will be the IQR of the data (approximately)?   
10-18

Q19) Comment on the below Boxplot visualizations?



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

Ans: both plot data is normally distributed, So we can say both the distributions are follow normal distribution (mean=mdedian=mode)

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)

=33/81

* 1. P(MPG<40)

=61/81

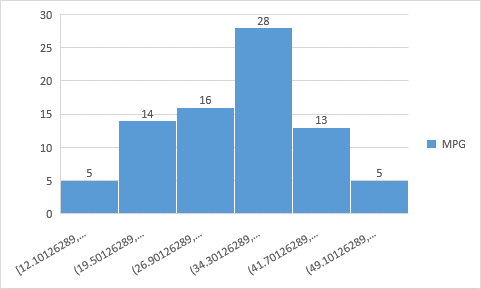
c. P (20<MPG<50)

= 69/81

Q 21) Check whether the data follows normal distribution

1. Check whether the MPG of Cars follows Normal Distribution

Dataset: Cars.csv

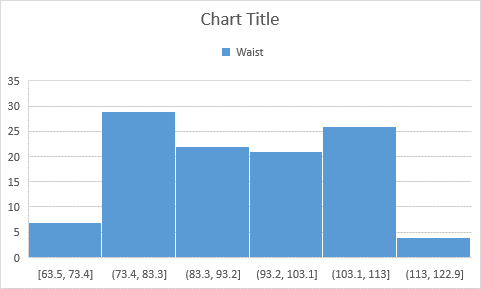


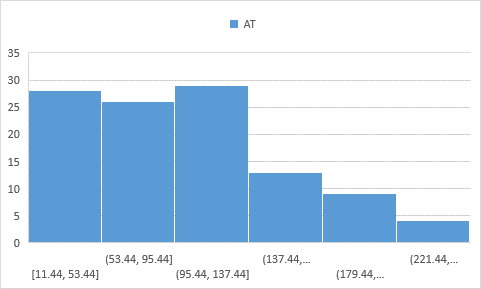
It is a normal distribution

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

Dataset: wc-at.csv

Waist not a normal distribution





AT normal Distribution

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

Ans: python code

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

Ans: python code

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: python code