|  |  |
| --- | --- |
| 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 | Ratio Ordinal |
| IQ(Intelligence Scale) | Ordinal |
| Sales Figures | Ratio |
| Blood Group | Nominal |
| Time Of Day | Interval |
| Time on a Clock with Hands | Interval |
| Number of Children | Ratio |
| 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 🡪 Three coins are tossed simultaneously.

Possible outcomes={HHH,HHT,HTH,HTT,TTT,TTH,THT,THH}

No. of total outcomes=8

Favorable outcomes={HHT,HTH,THH}

No. of favorable outcomes=3

Therefore,

Probability of getting exactly two heads=3/8  
 ans=0.375

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

1. Equal to 1

Ans🡪 0

1. Less thanorequalto4

Ans🡪3/36=1/12=0.083

1. Sum is divisibleby2 and 3

Ans 🡪5/36=0.138

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🡪 Total number of balls = (2 + 3 + 2) = 7.

Let S be the sample space.

|  |  |
| --- | --- |
| Then, *n*(S) | = Number of ways of drawing 2 balls out of 7 |
|  | = 7C2 ` |
|  | |  |  | | --- | --- | | = | (7 x 6) | | (2 x 1) | |
|  | = 21. |

Let E = Event of drawing 2 balls, none of which is blue.

|  |  |
| --- | --- |
| https://ci4.googleusercontent.com/proxy/S3kcpjCsZcAi7akKHNw5U7CYcjZkeMpVWOHYpOxeYiJsFbJvYOhTq3BjTJVsJFdBdXJ5hvPKzCVtn-G3w_Ra3U0IPU8ZhXnSXisrnwpNxAI=s0-d-e1-ft#https://www.indiabix.com/_files/images/aptitude/1-sym-tfr.gif*n*(E) | = Number of ways of drawing 2 balls out of (2 + 3) balls. |
|  | =5C2 |
|  | |  |  | | --- | --- | | = | (5 x 4) | | (2 x 1) | |
|  | = 10. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| https://ci4.googleusercontent.com/proxy/S3kcpjCsZcAi7akKHNw5U7CYcjZkeMpVWOHYpOxeYiJsFbJvYOhTq3BjTJVsJFdBdXJ5hvPKzCVtn-G3w_Ra3U0IPU8ZhXnSXisrnwpNxAI=s0-d-e1-ft#https://www.indiabix.com/_files/images/aptitude/1-sym-tfr.gifP(E) = | *n*(E) | = | 10 | . |
| *n*(S) | 21 |

=10/21=0.476

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 \* 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

=       3.090

=  3.09

Q7) Calculate Mean,Median, Mode,Variance,StandardDeviation,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🡪** 1] Means of Points=3.5966 ,Var of Points=0.2859 , SD of Points=0.5347

Range of Ponits= 2.17

2] 1] Means of Score =3.2173,Var Score =0.9574, SD Score =0.9785

Range of Score =3.911

3] Means of Weigh =17.8488,Var Weigh=3.1932, SD Weigh=1.7869

Range of Weigh =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**🡪 Expected Value  =  ∑ ( probability  \* Value )

 ∑ P(x).E(x);there are 9 patients

Probability of selecting each patient = 1/9

Ex  108, 110, 123, 134, 135, 145, 167, 187, 199

P(x)  1/9  1/9   1/9  1/9   1/9   1/9   1/9   1/9  1/9

Expected Value  =  (1/9)(108) + (1/9)110  + (1/9)123 + (1/9)134 + (1/9)135 + (1/9)145 + (1/9(167) + (1/9)187 + (1/9)199

= (1/9) ( 108 + 110 + 123 + 134 + 135 + 145 + 167 + 187 + 199)

= (1/9)  (  1308)

= 145.33

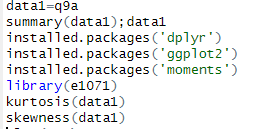
Expected Value of the Weight of that patient = 145.33

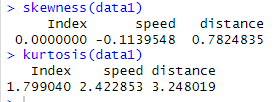
**Q9) Calculate Skewness, Kurtosis & draw inferences on the following data**

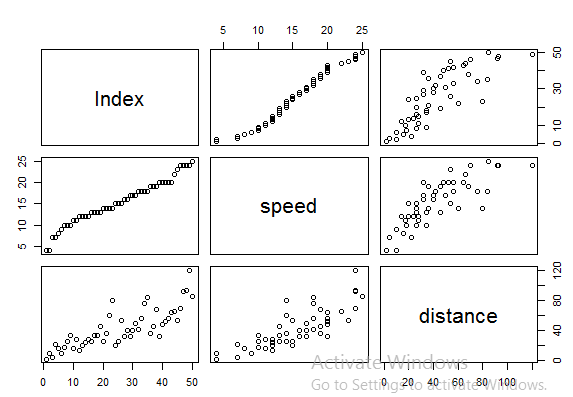
**Cars speed and distance**

**Use Q9\_a.csv**

**Ans🡪**



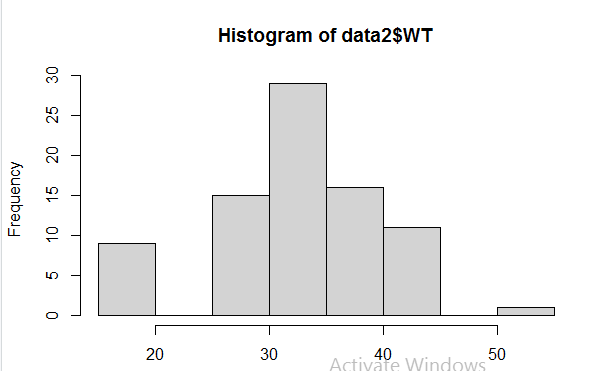
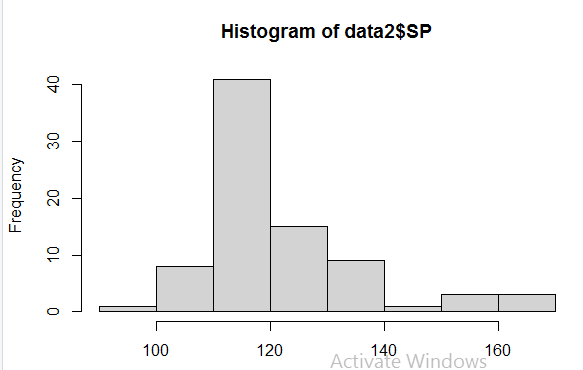
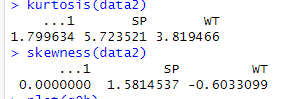
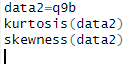




**SP and Weight(WT)**

**Use Q9\_b.cs**

**Ans🡪**



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



ANS🡪 Graph shows positive skewness because mass is concentrated on the left side of the graph



Ans🡪 Box plot contains outliers above upper extreme

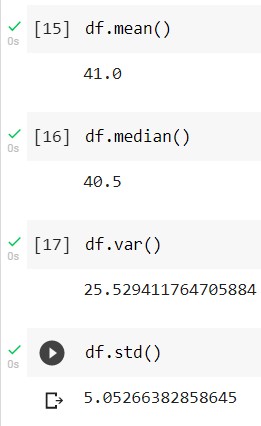
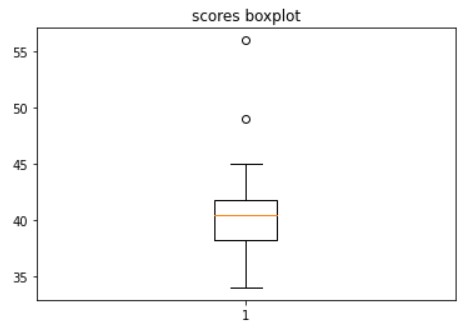
**Q11)** Suppose we want to estimate the average weight of an adult male in Mexico. We draw a random sample of 2,000 men from a population of 3,000,000 men and weigh them. We find that the average person in our sample weighs 200 pounds, and the standard deviation of the sample is 30 pounds. Calculate 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?

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

**Ans:-**When all mean & median data are equal then there is no Skewness plot.

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

**Ans:-** Plot shifts towards right then Skewness will be negative.

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

**Ans:-** Plot shifts towards left then Skewness will be positive.

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

**Ans:-** It shows thinner peak & wider tails.

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

**Ans:-** It shows wider peak & thinner tails.

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



What can we say about the distribution of the data?

ANS:- Data is not normally distributed.

What is nature of skewness of the data?

ANS:- Mass is shifted towards right then skewness is negative

What will be the IQR of the data (approximately)?   
ANS:- IQR Data=10-18

19) Comment on the below Boxplot visualizations?



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

ANS:- 1.Boxplots are normally distributed.

2. There are no outliers in both the boxplots

3. Medians are same.

4. IQR are not same

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)

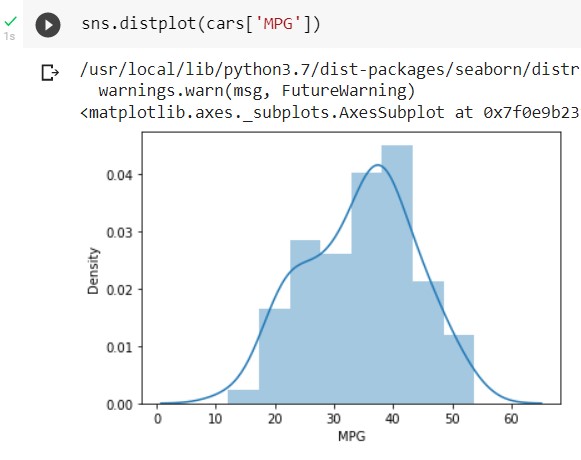
c. P (20<MPG<50)



Q 21) Check whether the data follows normal distribution

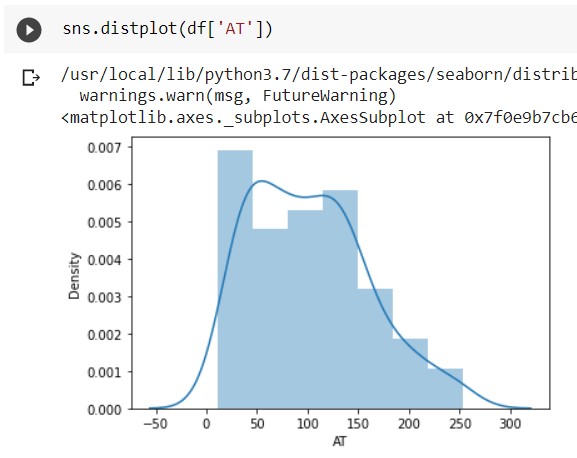
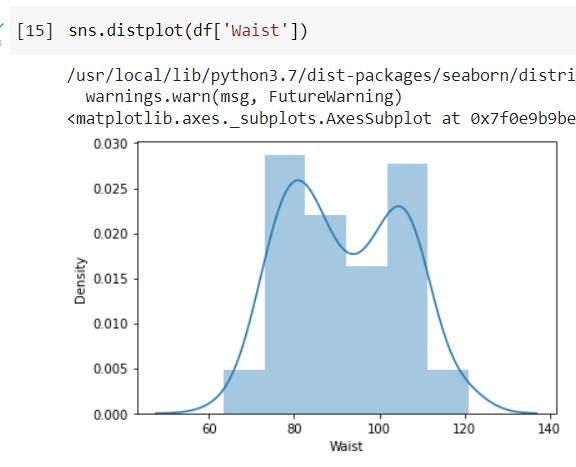
1. Check whether the MPG of Cars follows Normal Distribution

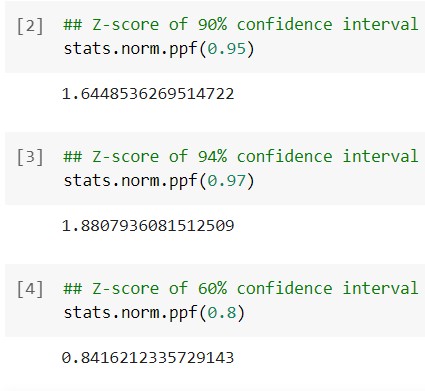
Dataset: Cars.csv

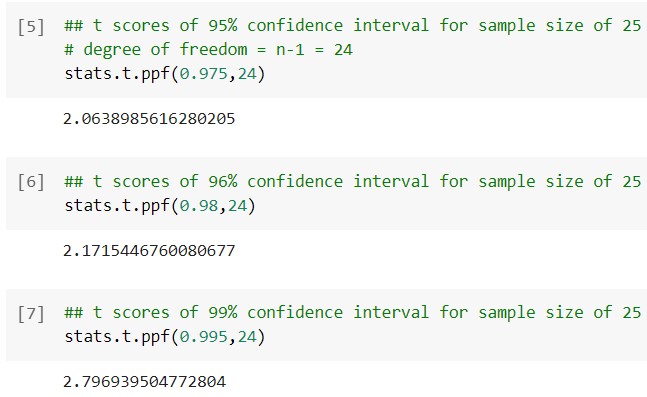


1. Check Whether the Adipose Tissue (AT) and Waist Circumference(Waist) from wc-at data set follows Normal Distribution

Dataset: wc-at.csv



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

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

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-

