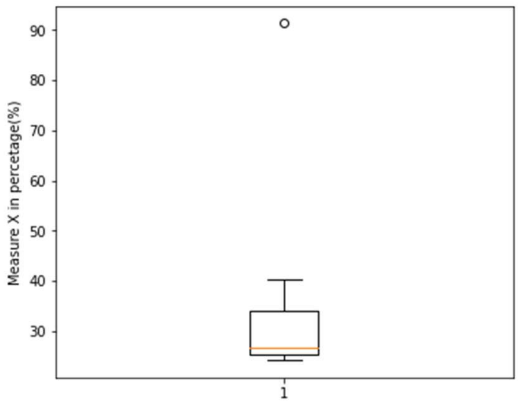
Topics: Descriptive Statistics and Probability

1. Look at the data given below. Plot the data, find the outliers, and find out μ, σ, σ^2.

Name of company	Measure X
Allied Signal	
Bankers Trust	25.53%
General Mills	25.41%
ITT Industries	24.14%
J.P.Morgan & Co.	29.62%
Lehman Brothers	28.25%
Marriott	25.81%
MCI	24.39%
Merrill Lynch	40.26%
Microsoft	32.95%
Morgan Stanley	91.36%
Sun Microsystems	25.99%
Travelers	39.42%
US Airways	26.71%
Warner-Lambert	35.00%

Answer:



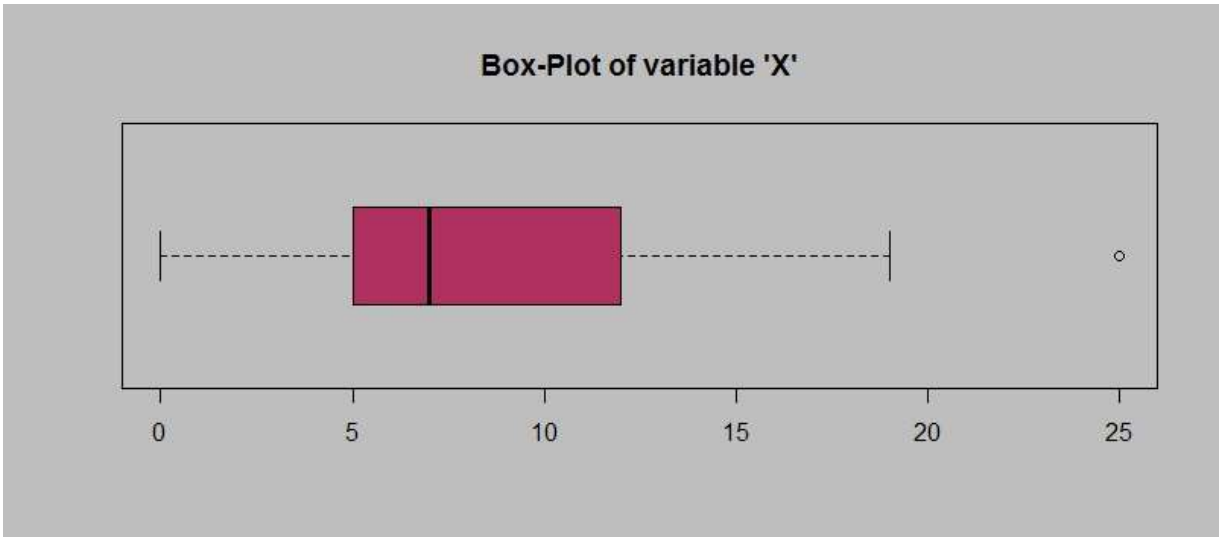
μ = 33.27% = 0.33

σ = 0.169454009

σ² = 0.028714661

As per the calculation there is one outlier in given dataset, and the value of outlier is 91.36%.

2.



Answer the following three questions based on the box-plot above.

(i) What is inter-quartile range of this dataset? (Please approximate the numbers) In one line, explain what this value implies.

(ii) What can we say about the skewness of this dataset?

(iii) If it was found that the data point with the value 25 is actually 2.5, how would the new boxplot be affected?

Answer:

(i) Inter-quartile = Q3-Q1 = 12-5 = 7

Range from 5 to 12 and Viscous 0 to 19

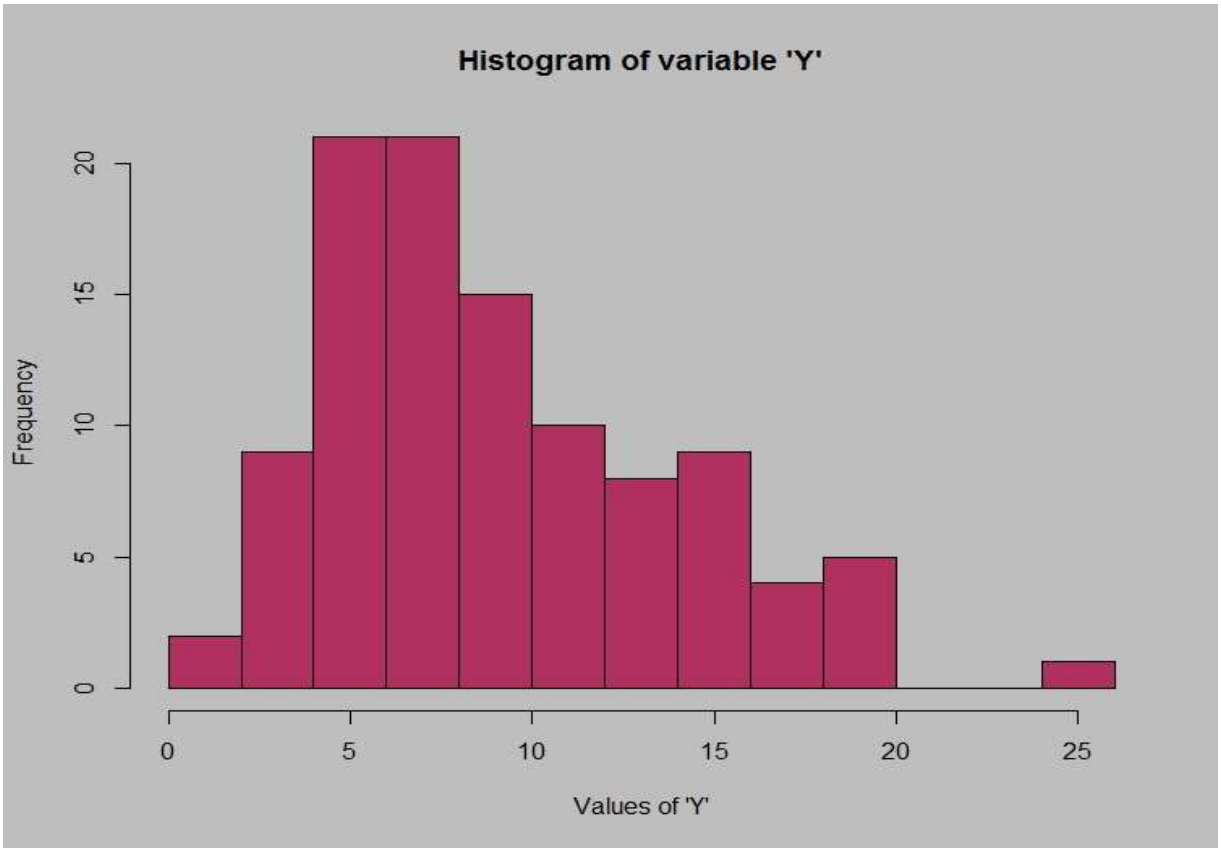
There is a one outlier in given dataset, value of outlier is **25**

- This value implies near to the median.

(ii) positive skewed, and mean greater than median.

(iii)

3.



Answer the following three questions based on the histogram above.

(i) Where would the mode of this dataset lie?

(ii) Comment on the skewness of the dataset.

Answer: Positive Skewed

(iii) Suppose that the above histogram and the box-plot in question 2 are plotted for the same dataset. Explain how these graphs complement each other in providing information about any dataset.

Answer:

(i) **The mode of these data is lie between 6 to 8.**

(ii) **This Histogram is positive skewed.**

(iii)

4. AT&T was running commercials in 1990 aimed at luring back customers who had switched to one of the other long-distance phone service providers. One such commercial shows a businessman trying to reach Phoenix and mistakenly getting Fiji, where a half-naked native on a beach responds incomprehensibly in Polynesian. When asked about this advertisement, AT&T admitted that the portrayed incident did not actually take place but added that this was an enactment of something that "could happen." Suppose that one in 200 long-distance telephone calls is misdirected. What is the probability that at least one in five attempted telephone calls reaches the wrong number? (Assume independence of attempts.)

Answer:

One in 200 long distance telephone calls are misdirecting so,

- ⇨ Probability of call misdirecting p = 1/200
- ⇨ Probability of call not misdirecting q = 1-1/200 = 199/200
- ⇨ Number of calls = 5

$P(x) = {}^{n}C_{x} * p^{x} * q^{n-x}$

At least one in five attempted telephone calls reaches the wrong number = 1- none of the call reaches wrong number

$= 1-P(0)$

$=1- {}^{5}C_{0} * (1/200)^{0} * (199/200)^{5-0}$

$= 1-(199/200)^{5}$

$= 0.0247$

5. Returns on a certain business venture, to the nearest $1,000, are known to follow the following probability distribution

x	P(x)
-2,000	0.1
-1,000	0.1
0	0.2
1000	0.2
2000	0.3
3000	0.1

(i) What is the most likely monetary outcome of the business venture?
(ii) Is the venture likely to be successful? Explain
(iii) What is the long-term average earning of business ventures of this kind? Explain
(iv) What is the good measure of the risk involved in a venture of this kind? Compute this measure

Answer:

(i) **x=2000** at the probability of **0.3** is the Most likely monetary outcome of the business venture of given data.

(ii) Venture is successful when the X is positive.
In the data we can see, there are three positive values of X – 1000, 2000,3000 and probability of this values are – 0.2,0.3,0.1.
Now, Take summation of

Probability = P (1000) + P (2000) + P (3000)
= 0.2+0.3+0.1
= 0.6

0.6 > 0.5
Hence venture likely to be successful as per calculation

(iii)

E(X)	**P(x)**	**E(X) × P(x)**
-2000	0.1	-200
-1000	o.1	-100
0	0.2	0
1000	0.3	200
2000	0.3	600
3000	0.1	300

Expected value = $\sum$ **E(X) × P(x) =** 800

As per calculation, long term average earing of business ventures = 800 $

Venture is likely to be positive as Expected values is positive = 800 $.

(iv) the good measure of the risk involved in a venture of this kind,

Standard Deviation = $\sqrt{Variance}$

E(X)	P(X)	E(X)= X × P(X)	E(X²) = X² × P(X)
-2000 -1000 0 1000 2000 3000	0.1 0.1 0.2 0.2 0.3 0.1	-200 -100 0 200 600 300 = 800	400000 100000 0 200000 1200000 900000 = 2800000

Variance (X)	= $E(X^2) - [E(X)]^2$ = $2800000 - (800)^2$ = 2160000