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	24.23%
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%

Ans - here we can use the formula

Q3 + 1.5 (IQR)

Q1 + 1.5 (IQR)

So on solving we get,

Mean = 33.37

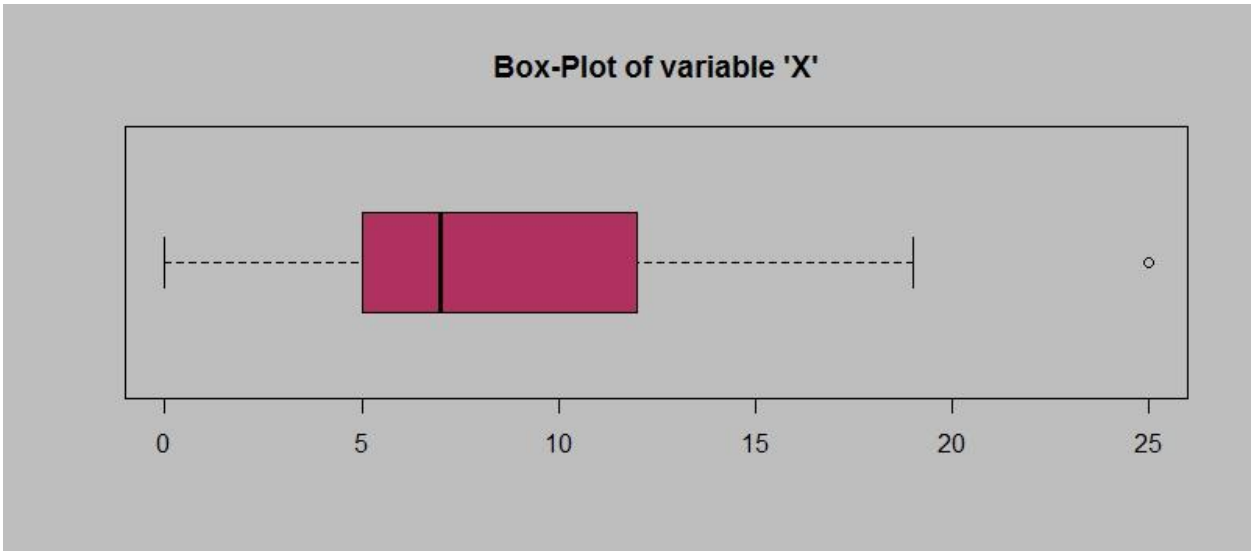
Std deviation = 16.945

Variance = 287.133

Morgan Stanley is outlier with 91.36%

Questions referred to from *Aczel A., Sounderpandian J., Complete Business Statistics (7ed.)*

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.

Ans - First Quantile Range,
Q1 = 5
Third Quantile Range
Q3 = 12
Therefore,
Inter-Quartile Range
IQR = Q3 – Q1 = 12 – 5 = 7
Thus 7 is Second Quartile Range and also the median value.

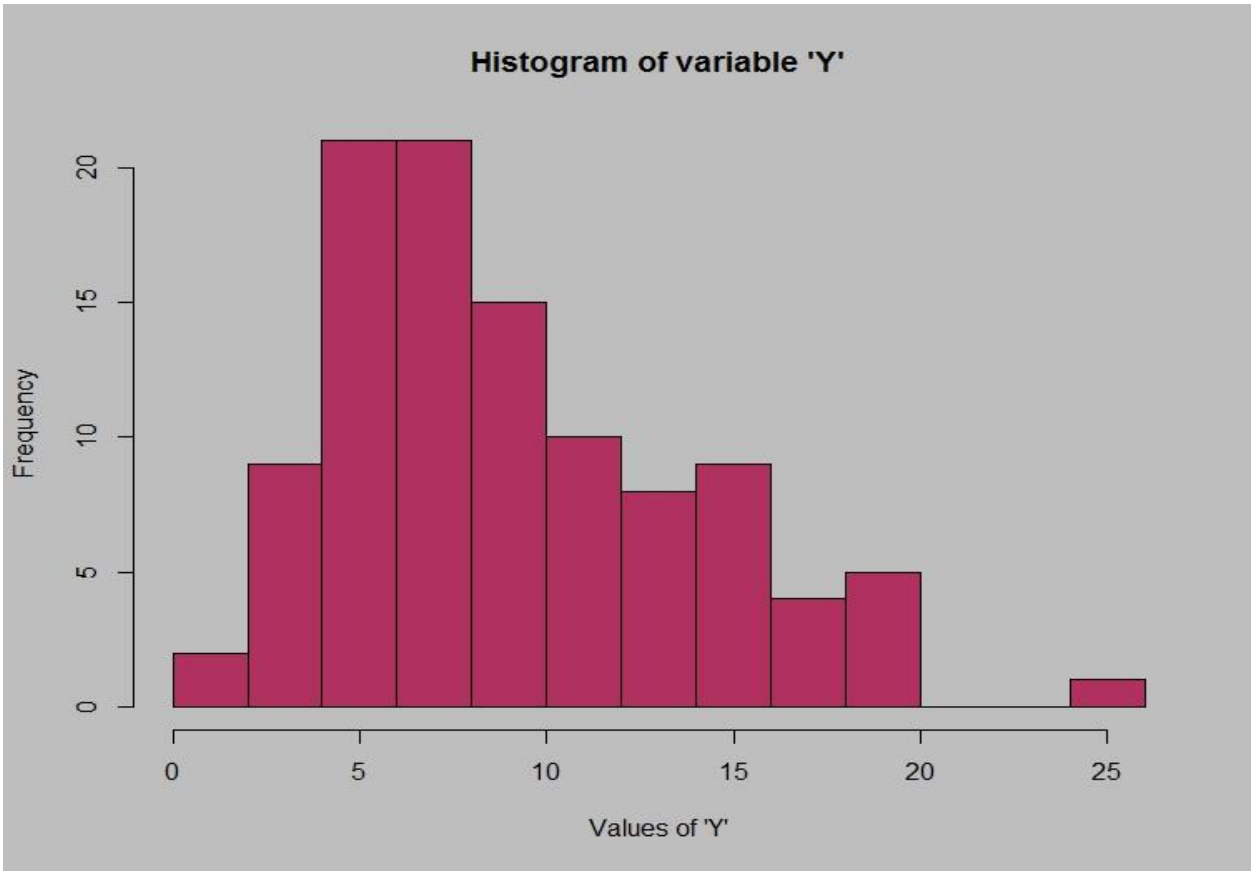
(ii) What can we say about the skewness of this dataset?

Ans - As the Right-Skewed median is towards the left side so it is not normal distribution.

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

Ans - In that case there would be no Outliers on the given dataset because of the outlier the data had positive skewness it will reduce and the data will normal distributed.

3.



Answer the following three questions based on the histogram above.

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

Ans - The mode of this datasetwould lie between 4 to 8.

(ii) Comment on the skewness of the dataset.

Ans - from figure we can say it is right-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.

Ans - They both are right-skewed and both have outliers the median can be easily visualized in box plot where as in histogram mode is more visible.

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.)**

Ans- Here we have that one in 200 long-distance telephone calls is misdirected,

Therefore,

The probability of call misdirected is

$p = 1/200$

and

Probability of call not misdirected is

$= (1 - 1/200)$

$= 199/200$

We have Number of Calls = 5

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

$n = 5$

$p = 1/200$

$q = 199/200$

so now here at least one in five attempted telephone calls reaches the wrong number will be,

$= 1 -$ no call reaches the wrong number

$= 1 - P(0)$

$= 1 - 5\text{^C}(0)\ (1/200)\text{^}0\ (199/200)\text{^}(5-0)$

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

$= 0.02475$

Therefore the probability is 0.02475.

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?

Ans - The monetary outcome of the business venture is 2000$ as it have maximum probability of 0.3 .

(ii) Is the venture likely to be successful?

Ans – it will be great and will be successful

(ii) What is the long-term average earning of business ventures of this kind? Explain

Ans - The long term average earning can be calculated as

E(X)	P(x)	E(X)P(X)
-2,000	0.1	-200
-1,000	0.1	-100
0	0.2	0
1000	0.2	200
2000	0.3	600
3000	0.1	300

Total - 800

Here we get expected value = E(X)P(X)

= 800

Hence long-term average earning of business ventures is 800 $

(iii) What is the good measure of the risk involved in a venture of this kind? Compute this measure

Ans - we can measure it by,

Var (X) = E(X^2) - { E(X) }^2

= 2800000 - 800^2

= 2160000

Then we get,

√Var = 14.69.69

= 1470 $

As variability is high then also risk will be high.