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

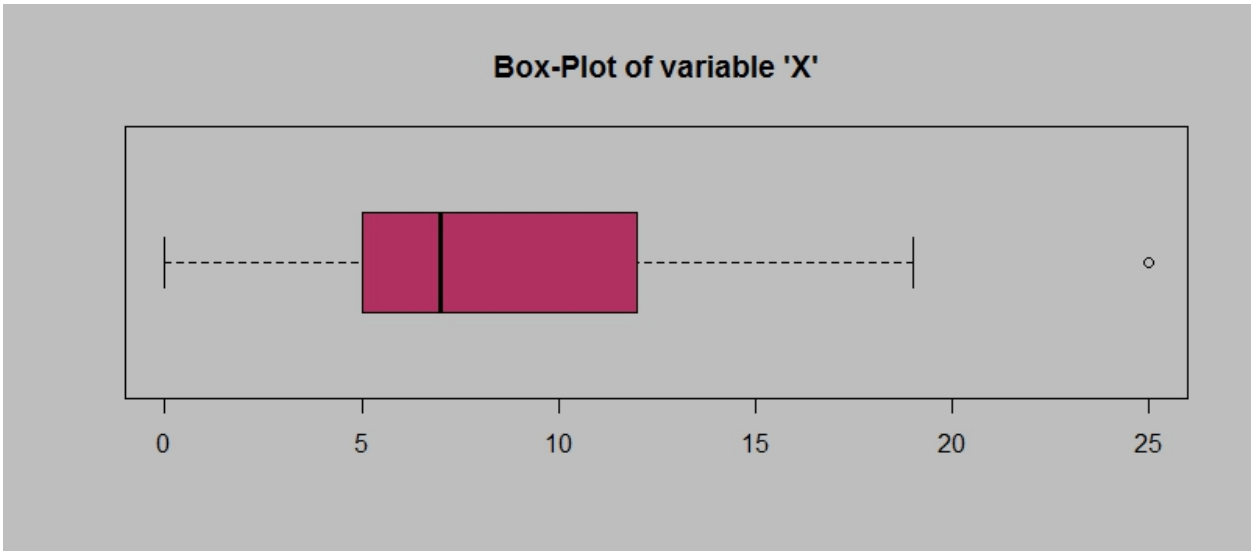
Name of company	Measure X
Allied Signal	24.23%
Bankers Trust	25.53%
General Mills	25.41%
ITT Industries	24.14%
J.P.Morgan & Co.	29.62%
Lehman Brothers	28.25%
Marriott	25.81%
MCI	24.39%
Merrill Lynch	40.26%
Microsoft	32.95%
Morgan Stanley	91.36%
Sun Microsystems	25.99%
Travelers	39.42%
US Airways	26.71%
Warner-Lambert	35.00%

Ans.

- Mean = 33.27133.
- Variance = 287.1466.
- Standard deviation = 16.9454.
- Morgan Stanley is the outlier in the Boxplot of 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. IQR = 7

- **Explanation**– IQR = 12-5 = 7, this represents the range which contains 50% of the data points and it have 1 outlier.

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

Ans.

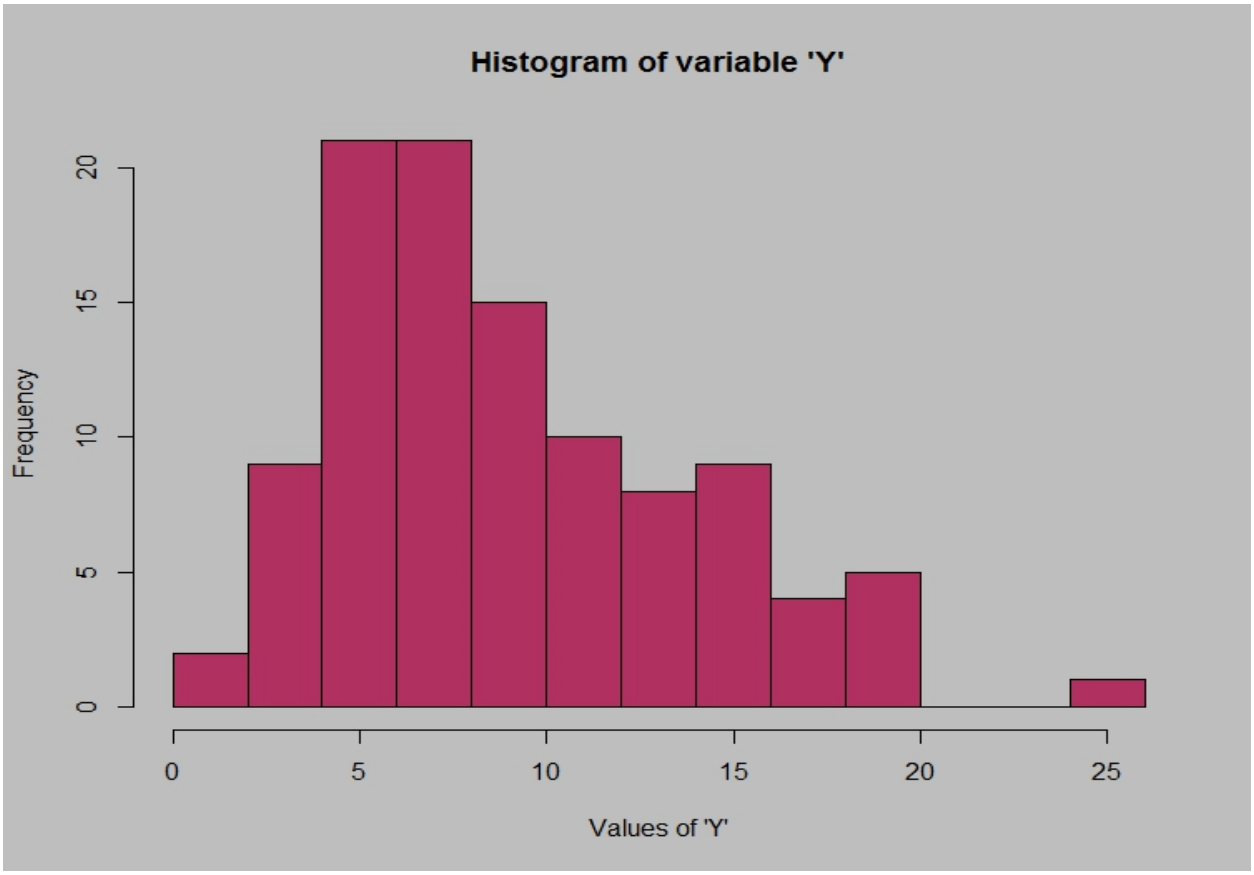
- The skewness of this dataset is right skewed /positively skewed.
- More than 50% of the data is between 7-12.

(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.

- Will be not considered an outlier. The boxplot will start from 0 and send at 20 in representation

3.



Answer the following three questions based on the histogram above.

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

Ans.

- Mode will lie between 4-8

(ii) Comment on the skewness of the dataset.

Ans.

- The dataset is right skewed /positively skewed and also have outlier.

(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.

- Median in boxplot and Mode in histogram
- Histogram provides the frequency distribution so we can see how many times each data point is occurring however boxplot provides the quantile distribution i.e. 50% data lies between 5 and 12.

Boxplot provides whisker length to identify outliers, no information from histogram. We can only guess looking at the gap that 25 may be an outlier.

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.

- n=No. of calls =5
- P=probability of calls mis direct=1/200
- Q=probability of calls not misdirect=1-1/200=199/200
- at least one in five attempted telephone calls reaches the wrong number

  ${}^{n}C_{r}\ P^{r}Q^{n-r}$=1-none of calls reaches the wrong number

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

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

  $=0.02475$

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.

- Max. P(x) = 0.3 for x (2000). So most likely outcome is 2000

(ii) Is the venture likely to be successful? Explain

Ans.

- P(x>0) = 0.6, implies there is a 60% chance that the venture would yield profits or greater than expected returns. P (Incurring losses) is only 0.2.
- So the venture is likely to be successful.

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

Ans.

- Weighted average = x*P(x) = 800. This means the average expected earnings over a long period of time would be 800(including all losses and gains over the period of time)

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

Ans.

P(loss) = P(x= -2000)+P(x=-1000)=0.2. So the risk associated with this venture is 20%.