# Assignment 2 : Basic Statistics 2

## Topics : Descriptive Statistics and Probability

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1. **Look at the data given below. Plot the data, find the outliers and find out $\mu, \sigma, \sigma^2$**

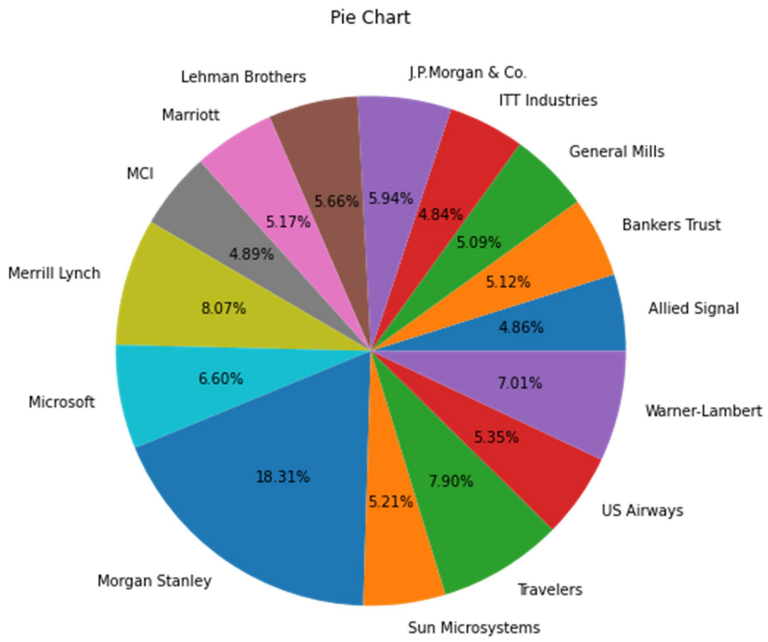
| Name of company | Measure X |
|---|---|
| Allied Signal | 24.23% |
| Bankers Trust | 25.53% |
| General Mills | 25.41% |
| ITT Industries | 24.14% |
| J.P.Morgan & Co. | 29.62% |
| Lehman Brothers | 28.25% |
| Marriott | 25.81% |
| MCI | 24.39% |
| Merrill Lynch | 40.26% |
| Microsoft | 32.95% |
|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

**Answer :**

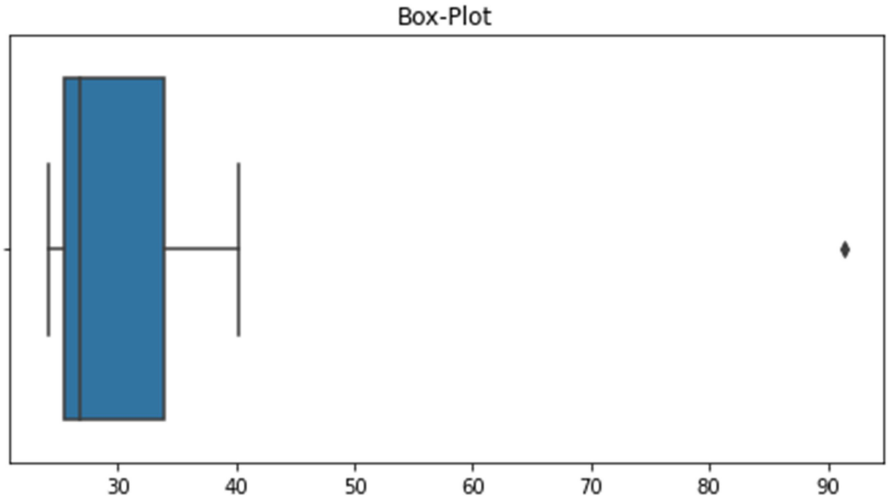
**Python Code :**

```
import pandas as pd
import seaborn as sns
from matplotlib import pyplot as plt

measure_X=pd.Series([24.23,25.53,25.41,24.14,29.62,28.25,25.81,24.39,40.26,32.95,91.36,25.99,39.42,26.71,35.00])

name_of_company=["Allied Signal","Bankers Trust","General Mills","ITT Industries","J.P.Morgan & Co.","Lehman Brothers","Marriott","MCI","Merrill Lynch","Microsoft","Morgan Stanley","Sun Microsystems","Travelers","US Airways","Warner-Lambert"]

plt.figure(figsize=(8,8))
plt.pie(measure_X,labels=name_of_company,autopct='%1.2f%%')
plt.title('Pie Chart')
plt.show()
```

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




```
plt.figure(figsize=(8,4))
sns.boxplot(measure_X)
plt.title('Box-Plot')
plt.show()
```




There is an outlier in our data.

```
#to find mean,variance and sd.
round(data.mean(),4)
```

Output : 33.2713

```
round(data.std(),4)
```

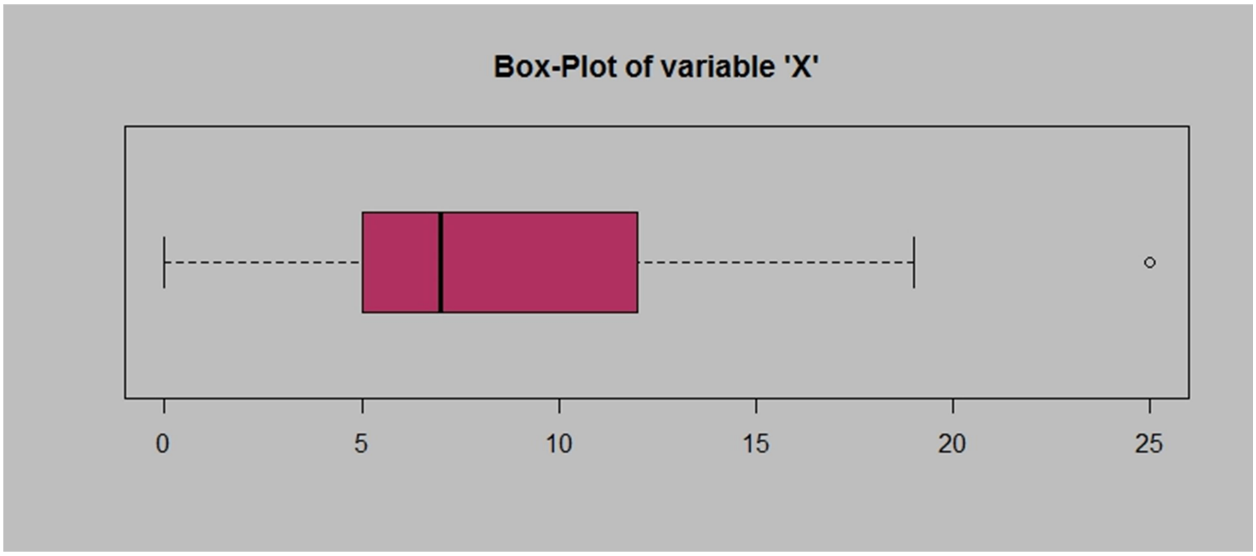
Output : 16.9454

```
round(data.var(),4)
```

Output : 287.1466

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.**

**Answer :** Here , 25 is an Outlier.
Median = 7
First quartile (Q1) = 5
Third quartile (Q3) = 12
IQR = Q3-Q1 = (12-5)
= 7

IQR tells the range of the middle half of the data.

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

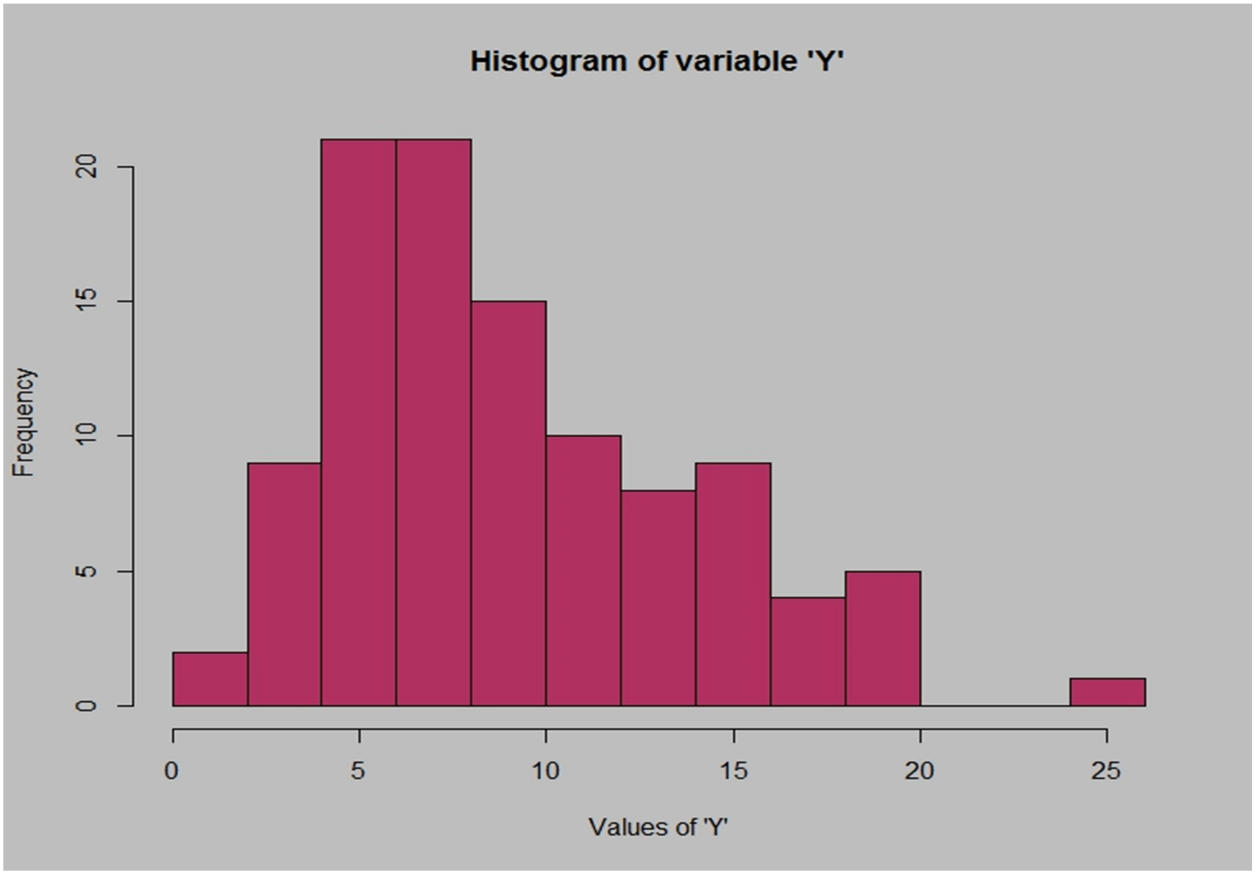
**Answer :** Positively skewed.

**(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?**

**Answer :**

In that case there will be no outliers, and it might have affected in the values of mean and median. The boxplot might have moved towards right.

**3.**




**Answer the following three questions based on the histogram above.**

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

**Answer :** Between 5 – 8 (Most frequent data)

**(ii) Comment on the skewness of the dataset.**

**Answer :** positively 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 :**

By comparing both of them it is clear that the data would be positively skewed. Also, it help us to finding mean, mode value.

**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 :**

Probability of call getting misdirected = $\frac{1}{200}$

Hence ,

probability of call not getting misdirected = $1 - \frac{1}{200} = \frac{199}{200} = 0.995$

Number of telephone calls attempted = 5

Therefore,
probability that at least one in 5 attempted call reaches the wrong number is,

$= 1 - (0.995)^5$

$= 0.0247$

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?**

**Answer :** Here , the highest probability is for 2000

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

**Answer :**

Yes. Because the total earnings of the venture is positive in value i.e. 800 and the highest probability of earning is 2000.

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

| x | P(x) | 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 |

The long-term average earning of business ventures is = 800

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

| x | P(x) | 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 |
| Variance | | 86666.67 |
| SD | | 294.3920 |