**Topics: Descriptive Statistics and Probability**

1. Look at the data given below. Plot the data, find the outliers and find out

|  |  |
| --- | --- |
| **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% |

Sol:

Table

Description automatically generated



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

1. What is inter-quartile range of this dataset? (please approximate the numbers) In one line, explain what this value implies.
2. What can we say about the skewness of this dataset?
3. If it was found that the data point with the value 25 is actually 2.5, how would the new box-plot be affected?

Sol:

1. IQR = Q3-Q1 = 12-5 = 7

IQR tells us that in a dataset, in which range does the bulk values lie.

1. Data in this data set is right skewed.
2. If the outlier is removed, the right skewness will reduce but it doesn’t mean that data will become normally distributed.

3.

Answer the following three questions based on the histogram above.

1. Where would the mode of this dataset lie?
2. Comment on the skewness of the dataset.
3. 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.

Sol:

1. Mode is the highest occurring value and based on the frequency it will be between 4 and 8
2. The data set is right Skewed as the tail is towards right.
3. Histogram clearly shows that data is right skewed which validates the box plot.

Also, frequency of values between 5 and 12 is more hence IQR from box plot is true.

1. 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.)

Sol:

Probability of 1 misdirected call = 1/200

Probability of 1 not misdirected call = 1- 1/200 = 199/200

Probability of 5 not misdirected call = (199/200)^5

Probability of at least 1 misdirected call out of 5 = 1- (199/200)^5 = 0.0247

1. 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 |

1. What is the most likely monetary outcome of the business venture?
2. Is the venture likely to be successful? Explain
3. What is the long-term average earning of business ventures of this kind? Explain
4. What is the good measure of the risk involved in a venture of this kind? Compute this measure

Sol:

1. P of getting monetary outcome = 0.2+0.3+0.1 = 0.6
2. Yes, the business is likely to be successful because Probability of getting positive return is 60%
3. X \*P = -200 – 100 +0+200+600+300 = 800
4. We can calculate the standard deviation and if it is very high, it means there is lot of risk involved in this business.

σ = sqrt[ ( -2,000 - 800 )^2 \* 0.1 + ( -1,000 - 800 )^2 \* 0.1 + ( 0 - 800 )^2 \* 0.2 + ( 1,000 - 800 )^2 \* 0.2 + ( 2,000 - 800 )^2 \* 0.3 + ( 3,000 - 800 )^2 \* 0.1 ]

=1247 (which is high standard deviation)