**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% |



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?

Ans :

i) IQR = Q3 – Q1 = 12 – 5 = 7 (Approx).

Second quartile range is the median value.

It means 50% of the data points lie in the range of 5 & 12.

ii) : It is Right-Skewed

iii) The median value will remain same, and the data will normally distribute but the interquartile range will change moreover there will not have any outlier.



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.

Ans :

1. Most of this dataset lies between 5 to 10
2. Right Skewed.Mean > Median > Mode.

iii) Median can be easily visualized in the boxplot.

Both are right skewed & both have outliers whereas in histogram mode is more visible.

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.)

Ans :

IF 1 in 200 long-distance telephone calls are getting misdirected.

Probability of call misdirecting = 1/200

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

The probability none of the call reaches the wrong number = ⁵C₀(1/200)⁰(199/200)⁵⁻⁰

At least one in five attempted telephone calls reaches the wrong number

P(x) = 1 - (199/200)⁵

= 0.02475

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?

Ans : The most likely outcome is the outcome that has the highest probability. In this case, the outcome with the highest probability is a return of $2000.

1. Is the venture likely to be successful? Explain.

Ans : Expected return = Σxp(x) = (-2000)(0.1) + (-1000)(0.1) + (0)(0.2) + (1000)(0.2) + (2000)(0.3) + (3000)(0.1) = 800

The variance of the return is $40,000. This is calculated by finding the average of the squared deviations from the expected return, where the deviations are weighted by the probabilities of each return.

Variance = Σ(x - μ)^2p(x) = (-2000 - 800)^2(0.1) + (-1000 - 800)^2(0.1) + (0 - 800)^2(0.2) + (1000 - 800)^2(0.2) + (2000 - 800)^2(0.3) + (3000 - 800)^2(0.1) = 40,000

The venture is likely to be successful because the expected return is positive. This means that, on average, we can expect to make money from the venture. However, there is also a risk involved, as the variance of the return is high. This means that there is a possibility of losing money.

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

Ans. The long-term average is Expected value

= Sum (X \* P(X))

= 800$

which means on an average the returns will be + 800$

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

Ans .:The standard deviation is a good measure of the risk involved in a venture of this kind A high standard deviation indicates that there is a high degree of uncertainty about the actual return, while a low standard deviation indicates that the returns are more likely to be close to the expected return.

In this case, the standard deviation is $200. This means that there is a wide range of possible returns, from a loss of $2000 to a gain of $3000. The actual return is therefore uncertain, and there is a risk of losing money.