**Topics: Descriptive Statistics and Probability**

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

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| --- | --- |
| **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. Morgan Stanley is an outlier with 91.36%

Mean 33.2713

Variance = 287.1466

Std Deviation = 16.9454



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.

Ans. The first quartile range Q1 is 5 , third quartile range Q3 is 12

hence the inter-quartile range = Q3- Q1 = 12-5 = 7

Therefore, the second quartile range 7 is the median value.

1. What can we say about the skewness of this dataset?

Ans. The median is closer to the bottom of the box hence the distribution is positively

skewed or right-skewed.

1. 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 in the data. The distribution had positive skewness because of the outlier now since there won’t be an outlier the data will be normally distributed.



Answer the following three questions based on the histogram above.

1. Where would the mode of this dataset lie?

Ans. The mode of the dataset will lie approximately between 4 to 8.

1. Comment on the skewness of the dataset.

Ans. Here Mode<Median<Mean. The distribution is right-skewed.

1. 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 have positive skewness and have outliers. The median can be easily

seen in boxplot while mode can be easily seen through histogram.

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 out of 200 calls are getting misdirected, the probability of call misdirecting= 1/200

probability of call not misdirecting = 1- 1/200= 199/200.

The probability that at least one in five attempted telephone calls reaches the wrong number

is P(x)= (nCx)(p^x)(q^n-x)= n!/r!\*(n-r)! ,here n=5, p=1/200, q=199/200

P(x)= (5C1)(1/200)^1(199/200)^5-1 = 0.0245

Hence, the probability of at least one in five attempted telephone calls reaches the wrong

number is 0.0245.

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 monetary outcome is the expected return of venture

i.e. E(X) = ∑ X.P(X)= -200, -100, 0, 200, 600, 300 = 800

E(X^2) = ∑X^2. P(X)= 400000, 100000, 0, 200000, 1200000, 900000 = 2800000

Therefore, the most likely monetary outcome of the business venture is

2000$ with probability 0.3 which is maximum as compared to others.

1. Is the venture likely to be successful? Explain

Ans. The probability that the venture will make more than 0 or a profit is

p(x>0)+p(x>1000)+p(x>2000)+p(x>3000)= 0.8

This states that there is a good 80% of chance for the venture to be successfully making

profits.

1. What is the long-term average earning of business ventures of this kind? Explain

Ans. The long-term average is expected value which is E(X) = ∑ X.P(X) = 800.

This means that on an average the returns will be more than 800$.

1. What is the good measure of the risk involved in a venture of this kind? Compute this measure

Ans. The good measure of risk involved in a venture depends on the variability of the distribution. Var(X) = E(X^2)- (E(X))^2= 2800000 – 800^2 = 2800000-640000

= 2160000.

Hence, as the variability is quite high the risk involved is high.