**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% |

**Mean = 33.338%**

**Variance = 285.909%**

**Standard Deviation = 16.909%**

**There is one outlier present in the data, which is Morgan Stanley (91.36%).**



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.

**Upper quartile = 12**

**Lower quartile = 5**

**IQR = 12-5 = 7**

**Most of the data lies between IQR.**

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

**Positively** **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?

**The boxplot shown above, we can easily infer that the data point with value 25 is an outlier as it is present outside the whiskers. If the value happens to be 2.5, present on the whiskers, there will be a slight difference in the mean and median. To get the actual values we have to analyze the data.**



Answer the following three questions based on the histogram above.

1. Where would the mode of this dataset lie?

**The mode can lie in the range 3 to 10, since most of the data is present there.**

1. Comment on the skewness of the dataset.

**Positively Skewed (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.

**Both the plots are positively skewed and has an outlier present with a value 25.**

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.)

**Probability of occurring misdirected calls (p): = 1/200.**

**Probability of not occurring misdirected calls (q): 1-1/200 = 199/200**

**Number of calls (n) = 5**

**P(at least one in five attempted telephone calls reaches the wrong number)**

**= 1 – zero call reaches the wrong number**

**= 1 – 5C0 (1/200)0 (199/200)5-0**

**= 1 – (1\*1\*(199/200)5**

**= 1 – 0.97524**

**= 0.02475**

**Therefore, probability of reaching one wrong number out of 5 telephone calls is 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 |

|  |  |  |  |
| --- | --- | --- | --- |
| **X** | **P(X)** | **E(X)=X\*P(X)** | **E(X2) = X2 \* P(X)** |
| -2000 | 0.1 | -200 | 400000 |
| -1000 | 0.1 | -100 | 100000 |
| 0 | 0.2 | 0 | 0 |
| 1000 | 0.2 | 200 | 200000 |
| 2000 | 0.3 | 600 | 1200000 |
| 3000 | 0.1 | 300 | 900000 |
| **TOTAL** |  | **800** | **2800000** |

1. What is the most likely monetary outcome of the business venture?

**$2000 is most likely monetary outcome of the business venture as it has the maximum probability 0.3.**

1. Is the venture likely to be successful? Explain

**Venture is successful if X is positive**

**P(x) = 0.2+0.3+0.1 = 0.6**

**Venture is likely to be successful.**

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

**E(X) = ƩX \* P(X) = 800**

**The long-term average earning of business ventures will be $800**

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

**The good measure to evaluate the risk is by finding the variance and standard deviation**

**Variance = E(X2) – [E(X)]2**

**= 2800000 – (800)2**

**= 2800000 – 3600**

**= 2160000**

**Standard Deviation: SQRT(2160000)**

**1469.69**

**A large value of standard deviation indicates high risk in venture.**