**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.

**Answer** - Here clearly “25” is the Outlier.

1st quartile = 5

2nd Quartile= 12

IQR=(12-5)=7

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

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

**Answer**- 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?

**Answer**- The median value will remain same,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?

**Answer** – Mode lies between 4 and 8

1. Comment on the skewness of the dataset.

**Answer**- Right Skewed

1. Suppose that the above histogram and the boxplot in question 2 are plotted for the same dataset. Explain how these graphs complement each other in providing information about any dataset.

**Answer**- Median in box plot and mode in histogram. histogram provides frequency distribution so we can see how many times each data point is occurring, however boxplots provides the quartile distribution i.e 50% data lies in between 5 and 12

Boxplot provides whisker length to identify outliers, no information from histogram. we can only guess looking at the gap that 25 may be an outliers.

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.)

**Answer-** one in 200 long-distance telephone calls is misdirected

=>  probability of call misdirecting  p = 1/200

     Probability of call not Misdirecting = 1 – (1/200) = 199/200

Number of Calls = 5

P(x) = ⁿCₓpˣqⁿ⁻ˣ

So here,

n = 5

p = 1/200

q = 199/200

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

= 1  -  none of the call reaches the wrong number

= 1  - P(0)

= 1   -  ⁵C₀(1/200)⁰(199/200)⁵⁻⁰

= 1  -  (199/200)⁵

= 0.02475

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

**Answe**r- Max. P(0.3) for P(2000). So most likely outcome is 2000

1. Is the venture likely to be successful? Explain

**Answer**- P(x>0)=0.6, implies there is a 60% chance that the venture would yield profit or greater than expected returns .P(Incurring losses) is only 0.2. so the venture is likely to be successful.

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

**Answer**- Weighted average =x\*P(x)=800 this means the average expected earning over a long period of time would be 800 (including all losses and gain over period)

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

**Answer**- P(loss)=P(x=-2000)+P(x=-1000)=0.2 so risk associated with venture is 20%