**Statistics and Probability Analysis using Excel**

This is an individual assignment.

Using Microsoft Excel, create a spreadsheet with a separate tab for each dataset appropriately labeled (dataset 1, dataset 2, etc.) For best calculation results, **enter the data provided below in column format.** Each data set is a complete sample. Calculations should use the appropriate Excel formula. Hand or manual calculations will not be given credit.

Within each dataset tab, imbed a textbox and provide a paragraph description of your analysis of the data and the results of each problem. What does the data mean, what is the significance of the statistical analysis, what can be learned from the data/calculations etc.

Upload one single Excel file and name your file yourlastnameLab1.xls

**DATA SET 1**

Determine the mean, median and appropriate standard deviation for the following selected sample of test scores from last year’s FPST 4333 final exam. Explain your results

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 49 | 73 | 87 | 94 | 57 | 81 |
| 39 | 71 | 95 | 99 | 69 | 87 |
| 51 | 79 | 97 | 95 | 65 | 93 |
| 57 | 86 | 92 | 87 | 62 | 98 |
| 52 | 88 | 110 | 88 | 67 | 104 |
| 94 | 72 | 83 | 71 | 73 | 77 |
| 89 |  |  |  |  |  |

**DATA SET 2**

In order to acquire the data necessary for further safety analyses, the system safety team has requested that a series of test be run on a brass bushing to be run without lubrication until it seizes (failure). The times to seizure for the sample set are listed below.  **Develop a set of statistics for the test and an appropriate histogram graph with no more than 7 groupings(bins) that describe and efficiently communicate the data. Explain your results**

Run time (minutes)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1143 | 1562 | 761 | 983 | 998 | 678 | 773 | 897 | 969 | 1082 | 886 | 849 |
| 923 | 1179 | 1256 | 935 | 967 | 1952 | 1685 | 1375 | 1168 | 1294 | 834 | 871 |
| 792 | 878 | 1967 | 1042 | 1297 | 1061 | 721 | 1236 | 1117 | 1227 | 842 | 1340 |

**DATA SET 3**

The hour meter reading for all engine failures, which have been reported to operations and maintenance, are listed below.  **Calculate the average failure time and a standard deviation.** **Develop a Histogram** chart with 5-7 categories to show the data graphically. Based on the graph, **recommend a time for overhaul to prevent 95%** of engine failures in these “critical” systems.

Time of failure (hours)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1477 | 1363 | 1677 | 1888 | 1398 | 2479 | 1881 | 1367 | 1401 | 1301 | 1264 |  |
| 1698 | 1497 | 1852 | 1492 | 1346 | 1673 | 1655 | 1475 | 1368 | 1695 | 1772 |  |
| 1274 | 1389 | 1488 | 1476 | 1682 | 1384 | 1345 | 1790 | 1621 | 1597 | 1389 |  |
| 1476 | 1672 | 1226 | 1378 | 1954 | 1862 | 1125 | 1883 | 1466 | 1389 | 1429 |  |

**DATA SET 4**

Flip a single coin 51 times and record the value. Calculate the **percentage of the time each value** was shown. How did this compare with expected values?

**DATA SET 5**

For the following data develop a scatter plot and determine a regression slope equation that approximates the relationship.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| X | 0 | 11 | 9 | 5.9 | 3.8 | 4.5 | 2.3 | 2.8 | 8.3 | 7.8 | 7.1 | 5.6 | 6.1 | 11.9 |
| Y | 1.5 | 100 | 84 | 43 | 47 | 46 | 19 | 31 | 94 | 66 | 52 | 74 | 58 | 125 |

|  |  |
| --- | --- |
| **Protection Factor** | **Multiplier** |
| Elimination | 0.1 |
| Substitution | 0.4 |
| Engineering - Multiple | 0.6 |
| Engineering - Single | 0.7 |
| Adm Control  Warning  PPE | 0.8 |

**DATA SET 6**

Think of at least ten hazards that you have observed or identified in your recent past. These items could be conditions that you observed on Lab Tours, Internships, or just simply observations in daily life. They can be personal safety hazards, process safety hazards, fire hazards, environmental hazards etc.

Create an Excel Table and calculate the risk of each item and build a scatter plot depicting the ISO risk curve.

Calculate the Initial Risk Mishap Index (IMRI) and Final Risk Mishap Index FRMI before and after countermeasures have been implemented See Chapter Ch6, Section 6.6 in your book.

Risk = Probability x Severity x Protection Factor

Use the following columns for your excel calculation sheet.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Hazard Description | Probability | Severity | Existing Countermeasures | PF | IRMI | Proposed Countermeasures  Corrective Actions | PF | FRMI |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |