

Problem 1

Given:

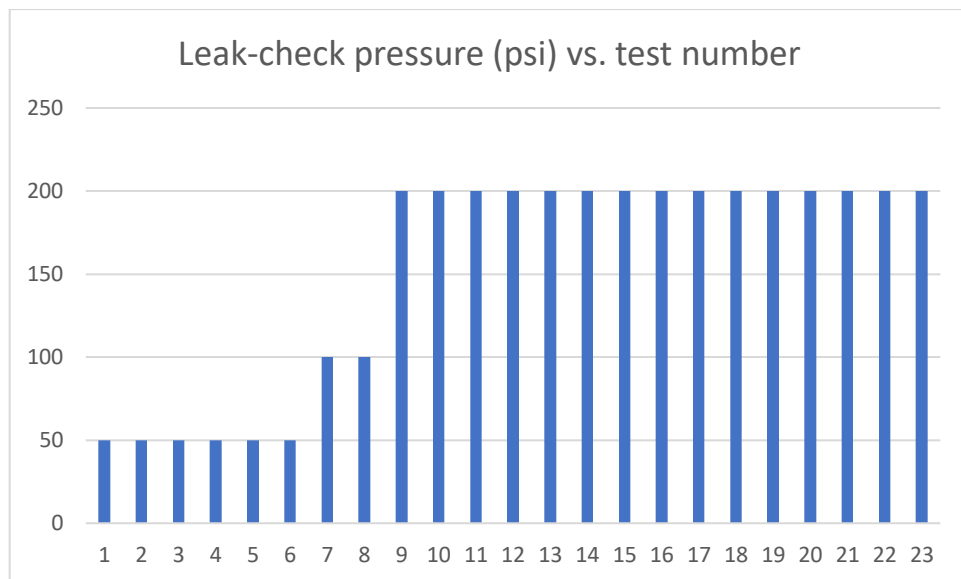
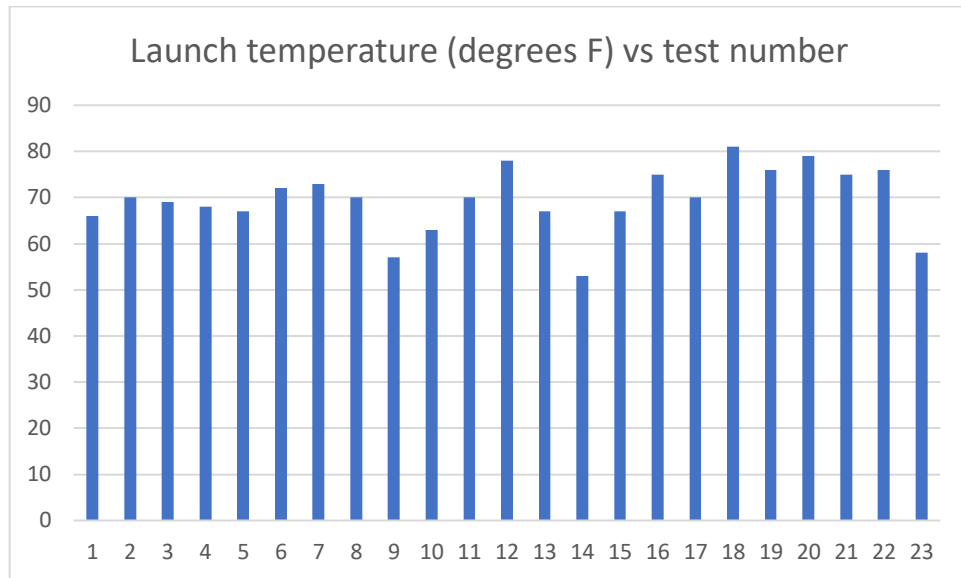
For this problem, we are given an Excel spreadsheet with 3 columns, the first being temporal order of flight, launch temperature in degrees F, and leak-check pressure in psi.

Find:

I am to find the following information using the data provided in the Excel spreadsheet.

- a. Mean, median, and mode of the leak-check pressure.
- b. Range, variance, and standard deviation of launch temperatures.
- c. Mean and standard error of the launch temperature.
- d. Standard error of the leak-check pressure.

Diagram:



Theory:

We will be using the following equations shown below.

$$\text{mean} = \frac{\sum x}{n}, n = \text{number of data points}$$

$$\text{median} = \frac{n+1}{2} \text{th term}, n = \text{number of data points}$$

mode = the data points that show up the most times in the data set

$$\text{range} = \text{max value} - \text{min value}$$

$$\text{variance} = \frac{\sum (x - \bar{x})^2}{n}$$

$$\text{standard deviation} = \sqrt{\text{variance}}$$

$$\text{standard error} = \frac{\text{standard deviation}}{\sqrt{n}}$$

Assumptions:

I can assume that this data will be taken from a population not a sample of data. When I calculated the data using the equation taken from a sample, I was getting the wrong answer for the variance, standard deviation, and standard error for the leak-check pressure.

Solution:

My solution to these sets of questions was to write a Python script that calculated the various values by importing statistics to simplify the code, not requiring me to write code for all the statistics equations shown above in the theory section.

```
import pandas as pd
import statistics

file_path = 'HW 1 Data Set _ Challenger ORings.xlsx'
df = pd.read_excel(file_path)

# mean, median, mode of leak check pressure
```

```
leakcheckpressure = df['Leak-check pressure (psi)']
meanpressure = statistics.mean(leakcheckpressure)
medianpressure = statistics.median(leakcheckpressure)
modepressure = statistics.mode(leakcheckpressure)
#range, variance, standard deviation for launch temps
launchtemp = df['Launch temperature (degrees F)']
rangetemp = max(launchtemp) - min(launchtemp)
variance = statistics.pvariance(launchtemp)
stddeviation = statistics.pstdev(launchtemp)
# mean and standard error
meantemp = statistics.mean(launchtemp)
stderrortemp = statistics.stdev(launchtemp) / (len(launchtemp) ** 0.5)
# d. standard error of leak check
errorpressure = statistics.pstdev(leakcheckpressure) / (23 ** 0.5)
```

Answers:

For Leak-Check Pressure:

Mean: 152.17 psi

Median: 200 psi

Mode: 200 psi

For Launch Temperatures:

Range: 28 degrees F

Variance: 47.64

Standard Deviation: 6.90

Launch Temperature:

Mean: 69.57 degrees F

Standard Error: 1.47

Leak-Check Pressure:

Standard Error: 13.91