**Practice**

1. Regression Problem
   The equation below represents the relationship between the overhead widths (in cm) of seals measured from photographs and the weights of the seals (in kg).

   $$y_i = 175.33 + 2.3x_i$$

2. Interpretation of regression line
   **Interpretation:**

   If it is known that the standard error for $b_1$ is 5.26, what would you conclude about $H_0$?

3. Prediction Interval
   Find a 95% prediction interval estimate of the weight (in kilograms) of a seal given that the width from an overhead photograph is 9.0 cm where $s_e = 2.3$, $n(\sum x^2) - (\sum x)^2 = 23.32$, $n = 27$, $\bar{x} = 10$.

4. Bayes Theorem Problem

   A desk lamp produced by The Luminar Company was found to be defective (D). There are three factories (A, B, C) where such desk lamps are manufactured. A Quality Control Manager (QCM) is responsible for investigating the source of found defects. This is what the QCM knows about the company's desk lamp production and the possible source of defects: The QCM would like to answer the following question:

   | Factory | % of total production | Probability of defective lamps |
   |---------|-----------------------|--------------------------------|
   | A | $P(A) = 0.35$ | $P(D|A) = 0.015$ |
   | B | $P(B) = 0.35$ | $P(D|B) = 0.010$ |
   | C | $P(C) = 0.30$ | $P(D|C) = 0.020$ |

   If a randomly selected lamp is defective, what is the probability that the lamp was manufactured in factory C?

5. Distribution Breakdown

   (a) Bernoulli Distribution
       When to use it?:

   (b) Binomial Distribution
       When to use it?:

   (c) Poisson Distribution
       When to use it?:

   (d) Multinomial Distribution
       When to use it?:

(e) Normal Distribution
   When to use it?:


(f) Chi-Square Distribution
   When to use it?:


(g) t Distribution
   When to use it?:


(h) F Distribution
   When to use it?:

6. Contingency Table – Test of Goodness of Fit & Test Independence

A classic tale involves four carpooling students who missed a test and gave as an excuse a flat tire. On the makeup test, the instructor asked the students to identify the particular tire that went flat. If they really didn't have a flat tire, would they be able to identify the same tire? The author asked 41 other students to identify the tire they would select. The results are listed in the following table (except for one student who selected the spare). Use a 0.05 significance level to test the author's claim that the results fit a uniform distribution. What does the result suggest about the ability of the four students to select the same tire when they really didn't have a flat?

| Tire | Left front | Right front | Left rear | Right rear |
|---|---|---|---|---|
| Number selected | 11 | 15 | 8 | 6 |

7. ANOVA Problem

There are 3 types of voltage amounts measured: 1) electricity supplied directly to the author's home, 2) an independent Generac generator (model PP 5000), and 3) an uninterruptible power supply (APC model CS 350) connected to the author's home power supply. The results are shown below for analysis of variance obtained using JMP software. Use a 0.05 significance level to test the claim that the three power supplies have the same mean voltage in which 40 homes are sampled from each type.

| Type of Variation | Sum of Squares | Degrees of Freedom | Mean Square | Test Statistic (TS) |
|---|---|---|---|---|
| Between | $SSB = 28.61$ | $df_b =$ | $MSB =$ | $TS =$ |
| Within | $SSW = 9.21$ | $df_w =$ | $MSW =$ | |
| Total | $SST =$ | $df_t =$ | | |