Homework is due by 5:00 PM on the due date in my office. You can always hand in your homework at the end of lecture on Monday.

You may talk with others about the homework problems but please write your solutions up independently. Please answer homework questions in complete sentences. Make sure to staple the pages of your assignment together. Be sure to indicate your lab section on your paper.

You will have an opportunity to get help on homework during lab.

**Reading:**

Mar. 25 - Apr. 1 Sections 6.2, 6.3
Apr. 3 - Apr. 10 Section 7.1

**Assignment:**

1. Cans of a popular cola are supposed to contain 355 milliliters (ml) of cola. There is some variation from can to can because the filling machinery is not perfectly precise. The distribution of contents has a standard deviation \( \sigma = 4 \). An inspector who suspects that the filling mechanism is under filling, measures the contents of a random sample of twenty four cans. The total contents for the twenty four cans is 8493.6 ml.

   (a) Is this an observational study or an experiment? Explain briefly.
   (b) What is the sample mean contents for the twenty four cans?
   (c) Set up the null and alternative hypotheses for this problem. Be sure to state specifically what \( \mu \) represents.
   (d) Calculate the value of the test statistic.
   (e) Find the P-value for this problem.
   (f) Reach a decision, giving the reason for your decision and state a conclusion within the context of the problem.

2. Vitalife, a company that distributes natural vitamins and food supplements, uses in their advertising results from a study they conducted. It is known from past research that the mean serum cholesterol level of men aged 50 to 65 is 200 with a standard deviation, \( \sigma = 20 \). A random sample of 25 men aged 50 to 65 is selected from individuals on the company’s mailing list and given a daily supplement made from garlic. At the end of 3 months, the mean serum cholesterol for these 25 men is 195. Vitalife claims that this supports their claim that using their garlic supplement leads to a reduction in the average serum cholesterol level.

   (a) Was this a well designed and conducted experiment? Comment briefly.
   (b) Assuming that a well designed and conducted experiment produced a sample (n=25 men aged 50 to 65 taking the garlic supplement) mean serum cholesterol level of 195, would this be sufficient evidence to conclude that the serum cholesterol level for these men is significantly lower than the mean for men aged 50 to 65? Support your answer with a statistical test of hypothesis.

3. Using the established flight path, the mean flight time for large 4 engine jet aircraft flying from San Francisco to Honolulu has been 5.25 hours. The FAA proposes an alternate flight path but is concerned that the mean flight time will be different. For 100 flights using the alternative path, the average time is 5.47 hours.

   (a) Does this provide sufficient statistical evidence that the mean time is significantly different for the alternative path? Support your answer with a statistical test of hypotheses. You can assume that the population standard deviation (spread) \( \sigma = 0.8 \) hours.
   (b) If you later learned that the distribution of flight times was not normal but skewed to the right, would this have an effect on the procedure you performed above? Comment briefly.