Sample Sizes with Estimation Approach

- **Example 1.** ***Equal Sample Sizes***. A company owning a large fleet of trucks wishes to determine whether or not four different brands of snow tires have the same mean tread life (in thousands of miles). The company plans to use a balanced ANOVA procedure to do the test and wants to determine the sample size needed for each treatment arm. Management wishes a family confidence coefficient of 0.95 for the following three types of estimates:

  1. A comparison of the mean tread lives for each pair of brands: $\mu_i - \mu_{i'}$

  2. A comparison of the mean tread lives for the two high-priced brands (1 and 4) and the two low-priced brands (2 and 3):
  $$\frac{\mu_1 + \mu_4}{2} - \frac{\mu_2 + \mu_3}{2}$$

  3. A comparison of the mean tread lives for the national brands (1, 2, and 4) and the local brand (3):
  $$\frac{\mu_1 + \mu_2 + \mu_4}{3} - \mu_3$$

  Suppose that from past experience, the standard deviation is known to be approximately $\sigma = 2$ (thousand miles). The desired precision is to be ± 2 (thousand miles).

- **Example 2.** ***Unequal Sample Sizes***. In the precious example, suppose that tire brand 4 is the snow tire presently used and is to serve as the basis of comparison for the other brands. The comparisons of interest therefore are $\mu_1 - \mu_4$, $\mu_2 - \mu_4$, and $\mu_3 - \mu_4$. The sample size for brand 4 is to be twice as large as for the other brands in order to improve the precision of the three pairwise comparisons. The desired precision, with a family confidence coefficient of 0.90, is to be ± 1 (thousand miles).

- **Homework:** On page 772, do # 23, 24, 26, and 27.