Guided Thought Questions

MATH 322: Mathematical Statistics II
Learning Module 6: Analysis of Variance

All textbooks are written at two cognitive levels. The surface level is the literal information provided in the book. The deeper level is the connections between the topics. Textbooks are excellent at the surface level, rarely good at the deeper level. To help with the deeper levels, I am providing several questions for each section of the textbook.

You should take time to answer these questions after reading the section. Answer them in your notes. Make sure that you are able to confidently answer them. In fact, you should feel pressure to ask these questions in class if you cannot answer them.

Readings: Sections 10.1 to 10.5

§1: Introduction

1. For what types of hypotheses is ANOVA appropriate?

§2: ANOVA Methods for Two Treatments

1. How is this section a repeat of the sections covering the two-sample t-test?
2. How is a two-sample t-test more appropriate (more general) than ANOVA with two levels?

§3: ANOVA for Completely Randomized Designs (CRDs)

1. What makes a design "completely randomized"?
2. How is a CRD similar to the requirements of OLS regression?
3. How is ANOVA similar to OLS regression? How is it different?
4. Why does the test statistic follow an F distribution?

§4: Two-Way ANOVA, Randomized Complete Block Designs (Within-ANOVA)

1. Why would one "block" an experiment?
2. What is the typographical error in Table 10.6?
3. Why is this design also called a "within-treatments" design?

§5: Multiple Comparisons

1. In 25 words or less, what is the "multiple comparisons problem"?
2. In 25 words or less, how is it fixed?
3. Does the multiple comparisons problem exist only for t-tests, or is it for all compound hypotheses?
4. What is the logic behind Tukey's HSD test?