HOMEWORK THOUGHTS: A large part of this course is learning how to interpret and communicate results. That is, an isolated p-value will not ever be a complete answer to a question. As stated below, please always explain your answers in a sentence or two (unless, of course, the problem is truly just computational).

1. Section 1.5: 3, 4

2. Section 2.2: 2, 5, 8

3. Section 2.3: 7

4. Give an example of a statistic that does not estimate any corresponding population parameter. Explain.

5. Suppose a researcher, Pat, tests two new drugs to see if either significantly improves cholesterol level in patients. For each test, the null hypothesis is that the drug has no effect on cholesterol levels. Pat performs a hypothesis test for the first drug and finds that the observed p-value is 0.04. Pat then performs a hypothesis test for the second drug and finds that the observed p-value is 0.001. Pat concludes that the second drug will have a larger effect on the cholesterol level of individual patients. Is this a valid way to interpret the two p-values? Explain briefly.

6. Problem 1, section 3.1, page 135. Feel free to use R and the commands `pbinom` and `pnorm`.

7. Suppose that a particular brand of cereal markets that you'll win the "big" prize in every 1 out of 10 boxes. You have had a lot of the cereal, and you think they might be exaggerating. To test the claim, you open 30 boxes of cereal, and you must make a decision on whether you believe the claim.

    (a) What are your null and alternative hypotheses?

    (b) What is your test statistic?

    (c) Create a plot of the power of your test. Using your plot (and possibly specific numerical values from R) find a critical region with a specified level of significance. Argue that your test is reasonable.

    (d) If you found no boxes with a prize, what is your p-value? (Assume the null hypothesis is that 10% of the boxes have a prize.) Also, report whether these data (0 out of 30) make you believe the claim or not. Explain.

    (e) Given your decision (above), what can you say about your power? That is, does knowing the power change anything about how strongly you believe your decision? Explain.