Read Chapter 20 : Testing Hypotheses About Proportions
Particular attention will be given to:

- Null and alternative Hypotheses pg. 509.
- SD(pHAT) calculated at a point p0 pg. 509.
- Test Statistic ~ z = (pHAT - p0) / SD(pHAT) pg.509.
- p-Value pg. 511 (not the usual p as used for population fraction).
- z-Test pg. 513.
- Other hypotheses pg. 515 (see "Alternative Alternatives).
- Summary beginning pg. 519.

Lecture 12-2-09 will go over the following:

1. In a typical season one paticular menu item accounts for around 17 percent of red meat orders, but a promotion has possibly increased that. A random sampling of 200 red meat orders from 16,000 orders during one week finds 46 for the item (rather **more than** the 34 expected if $p_0 = 0.17$ applies). It is desired to test the hypothesis H_0: $p = 0.17$ versus the alternative hypothesis H_A: $p > 0.17$.

a. Determine pHAT from this data.

b. Is this test one-sided or two-sided?

c. Determine $SD(p_0)$.

d. Determine the value of the test statistic z.

e. Determine the p-value P(Z > test statistic value z from (d)) using the z-table.

f. A statistical test of the hypothesis H_0: p = 0.17 versus the alternative hypothesis H_A: p > 0.17 will take the action of "rejecting the null hypothesis H_0: p = 0.17" if the p-value (e) is less than $\alpha = 0.01$. Using p-value (e) it this action taken? If not we say the test has failed to reject H_0: p = 0.17.

The value α called the "significance level of the test" is chosen by the experimenter. Its practical meaning is the probability of "error of the first kind" which is in turn equal to the probability that H_0: p = 0.17 will be falsely rejected when indeed p = 0.17 (the value p_0). This would be a "false rejection."

g. Sketch the power curve of this test. Include α, p_0, in the sketch and also identify the roll of $\sqrt{n}$ (this is not in the readings, we will do it in class).

2. In a typical season one paticular menu item accounts for around 17 percent of red meat orders, but a promotion has possibly changed that. A random sampling of 200 red meat orders from 16,000 orders during one week finds 46 for the item (rather **different from** the 34 expected if p0 = 0.17 applies). It is desired to test the hypothesis H_0: p = 0.17 versus the alternative hypothesis H_A: $p \neq 0.17$.

a. Determine pHAT from this data.

b. Is this test one-sided or two-sided?

c. Determine SD(p_0).

d. Determine the value of the test statistic z.

e. Determine the p-value **P(| Z | > | test statistic value z from (d) |)** using the z-table.

f. A statistical test of the hypothesis H_0: p = 0.17 versus the alternative hypothesis H_A: p ≠ 0.17 will take the action of "rejecting the null hypothesis H_0: p = 0.17" if the p-value (e) is less than $\alpha = 0.05$. Using p-value (e) it this action taken? If not we say the test has failed to reject H_0: p = 0.17.

g. Sketch the power curve of this test. Include α, p_0, in the sketch and also identify the roll of $\sqrt{n}$ (this is not in the readings, we will do it in class).