## An Example of Inference

## Math 121 - Workshop

The herbal supplement Garcinia Cambogia is advocated by Dr. Mehmet Oz (a celebrity doctor and current director of Medicare and Medicaid) as an effective weight loss aid. However, most studies have failed to find evidence that Garcinia Cambogia works. Here is a summary of the results of one study from 1998.

A total of 135 subjects were randomized to either active hydroxycitric acid [The active ingredient in G. Cambogia] (n = 66) or placebo (n = 69); 42 (64%) in the active hydroxycitric acid group and 42 (61%) in the placebo group completed 12 weeks of treatment. Patients in both groups lost a significant amount of weight during the 12-week treatment period; however, between-group weight loss differences were not statistically significant (mean [SD], 3.2 [3.3] kg vs 4.1 [3.9] kg; P = 0.14).

Group	N	$\bar{x}$	s
Treatment	42	4.1	3.9
Control	42	3.2	3.3

1. This is an example of a randomized controlled experiment. Why is it important to use an experiment in this situation instead of an observational study?

2. What are the explanatory and response variables?

3. When they say that "patients in both groups lost a significant amount of weight", what do they mean? What kind of statistics did they do? Can you reproduce their findings?

4. Where did the P = 0.14 number come from? Perform your own statistical analysis to see if you agree with the researchers.

5. According to the researchers, the effect of Garcinia Cambogia is not statistically significant because the *p*-value was 0.14. Explain what that means. Does it mean the G. Cambogia definitely does not work?

6. One big advantage of confidence intervals over hypothesis tests is that confidence intervals let you estimate the **effect size** of a treatment. Make a confidence interval for the difference in mean weight loss between the two groups.