Math 3070 § 1. **Fourth Quiz** Name:_____
Treibergs $\sigma\tau$ December 4, 2013

This is an open book quiz. You are allowed to use your text, handouts and notes. Other books, laptops, PDA's, phones and text messaging devices are prohibited. Calculators are permitted. Be sure to give complete explanations to receive full credit. There are [30] total points.

_____/30

Hypothesis tests and p-values. A 1984 study in *Crustaceana* looked at the effect of infestation of the *Thenus Orientalis* lobster by barnacles. The carapace lengths (in millimeters) of ten randomly selected lobsters caught in the seas near Singapore were measured. Does the data indicate that the Singapore area lobsters have carapace length significantly less than 65 mm?

1. [12] State the null and alternative hypotheses. State the test statistic and the H_0 rejection region for a level-α test. Under what assumptions is your statistic valid?

2. [13] Here are the observed lengths. Compute the value of the test statistic. Find the p-value using the tables in the text. What is your conclusion?

```
> car.len = scan()
1: 50 52 56 58 60 60 63 65 66 78
11:
Read 10 items
> c( mean(car.len),  sd(car.len))
[1]  60.800000   7.969386
```

3. [5] What is a Type II error? Explain fully what this output says about Type II errors in this study.

```
power.t.test(10, delta=5, sd=7.969, type="one.sample", alternative="one.sided")

One-sample t test power calculation

          n = 10
      delta = 5
         sd = 7.969
  sig.level = 0.05
      power = 0.574362
alternative = one.sided
```