HW 3

1. Using the R data sets lh and $rivers$ and the ISwR data set $react$ (note all these data sets are vectors) find the 95% t CI intervals for their respective population means. Which of the three samples look reasonably normally distributed?

2. In the data set $vitcap$ (which is in the library ISwR) use the t test to compare the vital capcity for the two groups. Note $vitcap$ is a $data.frame$ so

```
smp1<-vitcat[[3]][1:12]
```

gives the data for the first group. Find a 99% CI interval for the difference. Why could this comparison be misleading.

3. A claims that the distribution of the diameters of ball bearings he supplies follows a gamma distribution with shape parameter 10 and scale parameter 1. B believes that they in fact follow a gamma distribution with shape parameter 12 and scale parameter 1. If she is correct how large of a sample should she take from his latest shipment to have a probability of at least 0.95 of proving him wrong.

4. Sometimes you will want to access data for a problem from the class web site. The data for this problem and the next is in the file prob4.4.txt and you can get it as follows:

```
> foo<-read.table(
+       "http://users.stat.umn.edu/~gmeeden/classes/5021/datasets/hw3.4.txt",
+       header=TRUE)
> names(foo)

[1] "grp1" "grp2"

> foo$grp1[1:5]

[1] 286 284 296 289 295
```

5. To test a new treatment an experimenter divided 50 randomly selected subjects into two groups of size 25. Assume that for the data in problem 4 $grp1$ got the treatment and $grp2$ did not. Find a 95% CI for the the means of the two groups. Repeat if I now tell you that $grp2$ is just $grp1$ after they have received the treatment.

6. Let $X_1, \ldots, X_6$ be iid normal(μ,9).

i) For testing $H : \mu \leq 30$ against $K : \mu > 30$ state the usual level $\alpha = .01$ test for this problem.

ii) Find the probability of making the type II error for this test when $\mu = 34$.

7. A random sample of size 9 was taken from a normal population with unknown mean μ and known variance 12.5.

i) For testing $H : \mu = 5$ against the alternative $K : \mu \neq 5$ give the usual critical or rejection region for the null hypothesis at level $\alpha = 0.05$.

ii) Find the probability of making the Type II error when $\mu = 7$.

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8. Let $X_1, \ldots, X_n$ be iid normal with mean μ and standard deviation σ. Consider testing $H : \mu = 0$ against $K : \mu > 0$ at level α where σ is known. If it is believe that $(\mu/\sigma) \doteq 1/3$ how large must n be so that for $\alpha = 0.05$ the power of the standard test at the assumed truth is at least 0.90?