STAT 217: Project 1
Due Friday, September 4 in class

You must work in a group of 3-4. There will be a point deduction if you do not work in a group.

The following excerpt from Verdot, et al. (2010) from an article titled, "A simple tool to ameliorate detainees mood and well-being in prison: physical activities" published in the French journal (sorry about the "translation"...) *International Review on Sport and Violence* describes their study.

> A total number of 26 male subjects, imprisoned between 3 to 48 months (M = 24.54; SD = 16.33), participated to the study. Aged between 20 and 59 years (M = 35.77; SD = 10.55) the detainees were held in custody for sexual offences. This particular population of prisoners was chosen because they are subjected to severe stress and idleness as they are housed separately from other prisoners in reason of the bad perception the latter have of their particular crimes.

> The participants were divided into two groups: 15 Sportsmen (aged 20 to 57 years, Mean: 33.3 9.4) who chose to follow the physical programme; and 11 References (aged 26 to 59 years, Mean: 39.1 11.5), who did not and wished to remain sedentary.

> Each sportsman participated in a programme of two to three physical exercise sessions per week lasting one to two hours and warranting a minimum of three hours per week. The sessions took place in a specific room and at definite time crenels, guaranteeing safety, space and time of practice without wardens and with the only presence of the physical instructor.

> The programme consisted in dual (table tennis and badminton) or collective (volley ball) physical exercises chosen in order to increase social interactions, enjoyment, motivation and adherence. The practice was of moderate intensity, adapted to each individual and was not intended to be a training programme.

Researchers would like to compare changes on the Perceived Stress Scale for the subjects in the sport program to those in the control. Conduct a permutation test to address this question. Summarize your results in a written report following the **Project Writing Guidelines** posted on D2L. The following R code will get you started.

Note: You should already have the `stress` dataset saved to your computer from the first homework assignment. Read the stress dataset into R before you run the following lines of code. You will also need to install the `beanplot` and `mosaic` packages before you begin. To do this, run `install.packages("mosaic")` and `install.packages("beanplot")`. Once these packages are installed, you will 'call' them by running `require(mosaic)` or `require(beanplot)`.

```
require(mosaic)

stress$Differences <- stress$PSSafter-stress$PSSbefore

favstats(Differences~Group, data=stress)
require(beanplot)
beanplot(Differences~Group, data=stress,method="jitter",log="",col=7)



#Permutation test
Tobs <- diffmean(Differences ~ Group, data = stress) ## this is the observed diff in means
B <- 1000 ## this is how many permutations you want
Tstar <- matrix(NA, nrow = B) ## setting up empty slots to put our permutation statistics in
for (b in 1:B) {
Tstar[b] <- diffmean(Differences ~ shuffle(Group), data = stress) ## the bth permutation stat
}
par(mfrow = c(1, 2)) ## telling R to put the two plots side by side
hist(Tstar)
abline(v = Tobs, lwd = 2) ## adding a line for the observed statistic
abline(v = -Tobs, lwd = 2)
plot(density(Tstar), main = "Density Plot of Tstar", xlab = "")
abline(v = Tobs, lwd = 2)
abline(v = -Tobs, lwd = 2)
pdata(abs(Tobs), abs(Tstar), lower.tail = F)



#Bootstrap CI
Tstar2 <- matrix(NA, nrow = B) ## setting up empty slots to put our bootstrap sample statistic
for (b in 1:B) {
Tstar2[b] <- diffmean(Differences ~ Group, data = resample(stress)) ## the bth bootstrap sampl
}
quantiles <- qdata(c(0.025, 0.975), Tstar2)
quantiles
```