**STAT502 Lab #7**

(*adapted from textbook exercise 21.5*) An accounting firm sampled 15 auditors to study three training methods (1=home, 2=local, 3=national) and their effect on statistical proficiency (100pt scale). Before assigning the training methods to the auditors, they were grouped into 5 blocks of three, depending on how recently they graduated (1=most recent,..,5=most distant). Finally, each block was assigned all three methods, one for each auditor. The data is in "auditor.dat" and can be read into R with

```
data = read.table('auditor.dat',header=T,sep='\t')
block = as.factor(data[,1])
method = as.factor(data[,2])
score = data[,3]
```

1. If $Y_{ij}$ represents the score for the auditor in the $i$th block receiving the $j$th training method, write the randomized complete block design (RCBD) ANOVA model for $Y_{ij}$.
2. How does this model differ from the one-way ANOVA model? How does this model differ from the two-way ANOVA model with interaction?
3. Use R's `interaction.plot()` with block on the horizontal axis, and comment on the evidence for interaction between block and method. Also, comment on the effects of method and block. Will blocking be effective in this situation? Explain.
4. Report the RCBD ANOVA table for the data, and use it to test whether the method mean scores are different.
5. Notice that with three methods and 5 blocks, we have exactly one observation per method$\times$block combination. What do you suppose would happen if we try to fit the two-way ANOVA model with interaction? Try this with

   ```
   anova(lm(score~method+block+method:block))
   ```

   Why is there an error with this model?
6. In terms of how the methods are assigned to the 30 auditors, explain how this situation would be different if it were analyzed as a completely random design (CRD) one-way ANOVA.
7. Using the same data set, fit the CRD one-way ANOVA model with method as the only factor, and report the ANOVA table. Compared with the RCBD ANOVA table, what has changed? What has not?