Homework 10

S320/520

Upload your answers as a PDF file or Word document through the Assignments tab on Canvas by 4pm, Thursday 19th November.

Note: Answers should be in your own words. Answers that are in the lecturer's words will not receive credit, and answers that are in the lecturer's words and punctuation may receive negative credit.

1. (10 points) Trosset chapter 12.6 problem set A
2. (10 points) Trosset chapter 12.6 problem set C. Note: Both times the question says $\overrightarrow{y}_1, \ldots, \overrightarrow{x}_5$, it should be $\overrightarrow{y}_1, \ldots, \overrightarrow{y}_5$.
3. (5 points) In theory, the ANOVA F-test can be used when there are only two samples if the normality and homoscedasticity assumptions are met. However, it's better to use Welch's t-test because it has weaker assumptions (e.g. variances may be different) while the F-test is sensitive to violations of its assumptions when there are only two samples.

   Recall for the untransformed stereogram data on Canvas (`stereograms.txt` in the Data folder of FIles):

```
> stereograms = read.table(file.choose(), header=TRUE)
> treatment = stereograms$time[stereograms$group==2]
> control = stereograms$time[stereograms$group==1]
> t.test(treatment, control)

Welch Two Sample t-test

data:  treatment and control
t = -2.0384, df = 70.039, p-value = 0.04529
alternative hypothesis: true difference in means is not equal to 0

> t.test(treatment, control, var.equal=T)

Two Sample t-test

data:  treatment and control
t = -1.9395, df = 76, p-value = 0.05615
alternative hypothesis: true difference in means is not equal to 0
```

So Welch's test gives a P-value of 0.04529, while Student's test gives a P-value of 0.05615.

Find a P-value for the F-test of the null hypothesis that the treatment and control populations have the same mean. How does this compare to the Welch and Student P-values?