

# Project 2

Due: March 11, 5pm

## Question 1:

Cardiac pacemakers contain electrical connections that are platinum pins soldered onto a substrate. The question of interest is whether different operators produce solder joints with the same strength. Twelve substrates are randomly assigned to four operators. Each operator solders four pins on each substrate, and then these solder joints are assessed by measuring the shear strength of the pins. Data from T. Kerkow.

Part a) Analyze these data to determine if there is any evidence that the operators produce different mean shear strengths.

Part b) Workers 1 and 2 were experienced, whereas workers 3 and 4 were novices. Find a contrast to compare the experienced and novice workers and test the null hypothesis that experienced and novice workers produce the same average shear strength.

Part c) Test the null hypothesis that all pairs of workers produce solder joints with the same average strength against the alternative that some workers produce different average strengths.

Data is available in:

<http://users.stat.umn.edu/~gary/book/fcdae.data/pr3.1>

## Question 2:

Pine oleoresin is obtained by tapping the trunks of pine trees. Tapping is done by cutting a hole in the bark and collecting the resin that oozes out. This experiment compares four shapes for the holes and the efficacy of acid treating the holes. Twenty-four pine trees are selected at random from a plantation, and the 24 trees are assigned at random to the eight combinations of hole shape (circular, diagonal slash, check, rectangular) and acid treatment (yes or no). The response is total grams of resin collected from the hole (data from Low and Bin Mohd. Ali 1985). Analyze these data to determine how the treatments affect resin yield

Data is available in:

<http://users.stat.umn.edu/~gary/book/fcdae.data/pr8.5>