

```
/* Montgomery 14.19 */
proc import datafile="/home/u63048916/STAT571B/Homework/Homework 7/Q14-19.xlsx"
  dbms=xlsx
  out=split
  replace;
  getnames=yes;
run;

/* proc mixed => Stat model 1: all terms included */
proc mixed data=split method=type1 CL;
class Temperature Shift Time;
model Strength=Temperature Time Temperature*Time;
random Shift Shift*Temperature Shift*Time Shift*Temperature*Time;
run;

/* proc mixed => Stat model 2: only 5 terms included (rest terms are pooled as the random error term) */
proc mixed data=split method=type1 CL;
class Temperature Shift Time;
model Strength=Temperature Time Temperature*Time;
random Shift Shift*Temperature;
run;
```

14.19. Steel is normalized by heating above the critical temperature, soaking, and then air cooling. This process increases the strength of the steel, refines the grain, and homogenizes the structure. An experiment is performed to determine the effect of temperature and heat treatment time on the strength of normalized steel. Two temperatures and three times are selected. The experiment is performed by heating the oven to a randomly selected temperature and inserting three specimens. After 10 minutes one specimen is removed, after 20 minutes the second is removed, and after 30 minutes the final specimen is removed. Then the temperature is changed to the other level and the process is repeated. Four shifts are required to collect the data, which are shown below. Analyze the data and draw conclusions, assuming both factors are fixed.

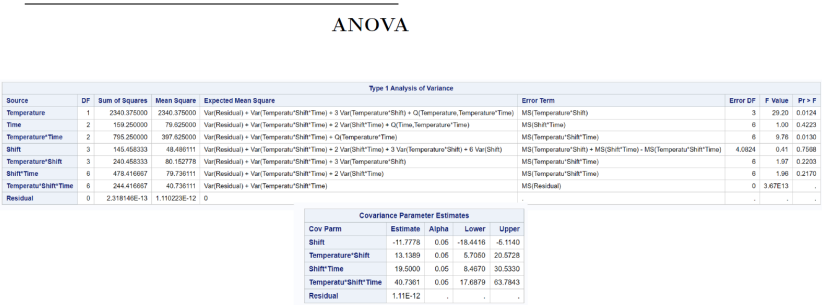


Figure 14.19.1

The whole plot treatment Temperature is significant at an $\alpha = 0.05$ level with P value of 0.0124. The whole plot / sub plot interaction term is also significant at $\alpha = 0.05$ level with P value of 0.0130. No other factors (including block factor Shift) or interactions are individually significant.

What does significance mean?

8 Need to check assumptions