STAT 217: Unreplicated designs 9/30

1. Refer to the data below. Is this a replicated or an unreplicated design? Explain how you know.

```
##    strength pressure temperature
## 1      9.60      120         250
## 2      9.69      130         250
## 3      8.43      140         250
## 4      9.98      150         250
## 5     11.28      120         260
## 6     10.10      130         260
## 7     11.01      140         260
## 8     10.44      150         260
## 9      9.00      120         270
## 10     9.57      130         270
## 11     9.03      140         270
## 12     9.80      150         270
```

2. Below is a partial anova table. Fill in the missing blanks.

Source	df	SS
pressure	__	.58
temperature	__	4.66
pressure*temperature	__	2.15
Residual	__	___

3. What did you get in the residual row above? Specifically explain why this is an issue.

4. Below is the interaction ANOVA table. Note the warning. What do you notice about the F-statistic and the p-value?

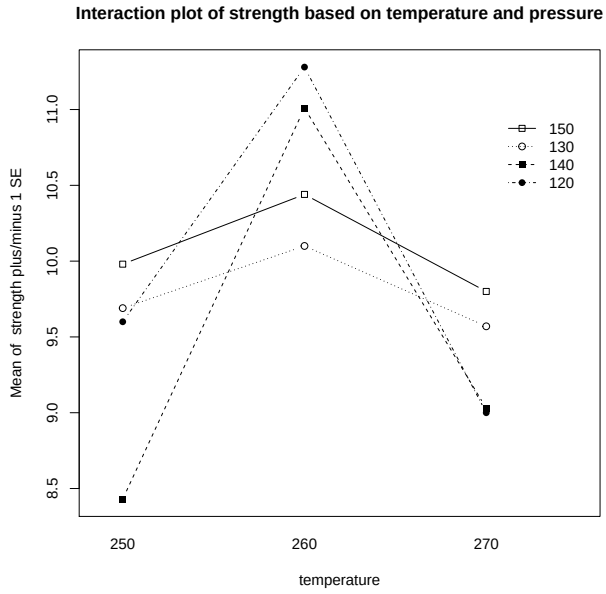
```
Warning in anova.lm(lm.int):  ANOVA F-tests on an essentially perfect fit are unreliable

Analysis of Variance Table

Response: strength
                     Df Sum Sq Mean Sq F value Pr(>F)
pressure              3 0.5807 0.19356
temperature           2 4.6576 2.32882
pressure:temperature  6 2.1539 0.35898
Residuals             0 0.0000
```

5. Below is the interaction plot for these data. How would **you** deal with the issue identified above?

```
source("~/Documents/Stat217Fall2015/exams/exam1/intplot.R")
intplot(strength~pressure*temperature, data=adhesive)
```



6. Below is the additive model, fit with Anova(lm.adhesive). In the temperature row, what distribution does the test statistic follow under the null hypothesis?

```
## Anova Table (Type II tests)
##
## Response: strength
##             Sum Sq Df F value  Pr(>F)
## pressure    0.5807  3  0.5392 0.67270
## temperature 4.6576  2  6.4873 0.03162 *
## Residuals   2.1539  6
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

7. Interpret the p-value in the temperature row of the Anova above. Refer to the example provided in class.