Stat 581 Problem Set # 2

A product developer is investigating the tensile strength of a new synthetic fiber that will be used to make cloth for men's shirts. Strength may be affected by the percentage of cotton used in the blend of material for the fiber. A completely randomized experiment with five levels of cotton content is performed.

The data is available on Blackboard as an Excel File.

1. State the statistical hypotheses of interest.
2. Briefly explain how the form of the alternative hypothesis requires a need for further investigation.

3. Create a Boxplot as a graphical display of the data.
4. Compute the sample mean and sample variance of tensile strength for each level of cotton percentage.
5. State the ANOVA model using treatment level effects. Compute estimates of the model parameters.

6.

(a) Compute the F_o statistic and the p-value. Perform the statistical test at level $\alpha = .05$. Provide an interpretation, stated in the context of the problem.

(b) Compute the t_o statistic and p-value for testing the 30% group versus the 25% group. Provide an interpretation, stated in the context of the problem.

(c) Compute the t_o statistic and p-value for testing the 25% group versus the 20% group. Provide an interpretation, stated in the context of the problem.

(d) Use the grouping information for Fisher pairwise comparisons to further investigate the nature of the treatment effect. Provide an interpretation, stated in the context of the problem.

7. Briefly discuss some other issues that may provide additional insight to an experimental result beyond a finding of statistical significance.