Module 06 - Generalizations: Check Your Knowledge Questions

Question 1:

Four elementary school classes have 10 students each. The school administrator obtained the standardized test scores for the 4 classes and performed an analysis of variance as shown below. Assuming that class effects and student effects are random, which contributes more to the variability of test scores: the classes or the "error" which is due to the variability of students within the classes. Explain.

Source	SS	df	MS	F	p-value
Class	410.83	3	136.94	5.28	0.0040
Error	933.11	36	25.92		
Total	1343.94	39			

Question 2:

A metal alloy is produced in a high-temperature casting process. Each casting is broken down into smaller individual bars that are used in applications requiring small amounts of the alloy. The tensile strength of the alloy is critical to its intended future use. The casting process is designed to produce bars with an average tensile strength above minimum specifications. Some variation in tensile strength among the bars is acceptable when only a small proportion of bars do not meet specifications. However, excessive variation results in an unacceptable proportion of bars that do not meet specifications.

The data are given in the file 'TensileStrengthData.txt'. Analyze these data in SAS, using both GLM and MIXED, and calculate the variance components. (Note: Some calculations will be done 'by hand' and some answers can be read from the SAS output.)

Acknowledgement: These data are from the second edition of "Design of Experiments: Statistical Principles of Research Design and Analysis" by Robert O. Kuehl.