

## MATH 204 - MID-TERM

*Please Hand in Assignment in the Lecture on Wednesday 7th February.*

Carry out analyses of the following two data sets, and report the results. In each case, state the design being used, and report the factors that are statistically significant in appropriate statistical tests. Include any plots that you think help to explain the results.

The data sets in SPSS and plain text format are available from the course website

[www.math.mcgill.ca/~dstephens/204/](http://www.math.mcgill.ca/~dstephens/204/)

1. The data set **GRASSES.SAV** contains information on an agricultural trial, carried with the objective of discovering which of a number of seed growth promotion techniques produced the highest yield.

Three methods of promoting seed growth (variable labelled **method**) are applied to seed from each of five varieties of plant (variable labelled **variety**). It was believed before the experiment that seeds from different varieties would grow differently.

Six plots are planted with seed from each combination of method and seed variety. The resulting ninety pots were randomly placed in a growth chamber, and the dry matter yields were measured after clipping at the end of four weeks.

Write a short report addressing the research objectives using ANOVA F-tests, including annotated ANOVA tables and SPSS Output, and a discussion of the results of the analysis.

*10 Marks*

2. The data set **TWILL.SAV** contains information on a quality control experiment investigating whether different manufacturing machines and/or different machine operators produced material of different tensile strengths.

Eight apparently identical strips of material were cut from a roll, and each strip was cut into twelve identical segments. The twelve segments were then randomly allocated to the twelve operator/machine combinations, and strength-tested.

In the data set, variables **strip** (S1-S8), **machine** (M1-M4) and **operator** (O1-O3) are recorded, as well as the tensile strength (variable **strength**) measured during a strength test.

- (a) Write a short report addressing the research objectives using ANOVA F-tests, including annotated ANOVA tables and SPSS Output, and a discussion of the results of the analysis.

*15 Marks*

- (b) Suppose that it was discovered that samples from within the same strip were fairly similar in terms of strength, but that different strips had different characteristics. Would your method of analysis change? Briefly justify your answer?

*5 Marks*