

## Bus 274: Further Statistics for Business

Spring 2010

### PROBLEM SHEET # 13

**Problem:** A large company buys thousands of lightbulbs every year. The company is currently considering four brands of lightbulbs to choose from. Before the company decides which lightbulbs to buy, it wants to investigate if the mean life of the four types of lightbulbs is the same. The company's research department randomly selected a few bulbs of each type and tested them. The following table lists the number of hours (in thousands) that each of the bulbs in each brand survived before burning out.

Brand 1	Brand 2	Brand 3	Brand 4
23	19	23	26
24	23	27	24
21	18	25	21
26	24	26	29
22	21	23	28
23	22	21	27
25	19	27	28

- a) Results of the ANOVA are given below. Complete the table. (It must become clear how you found the entries.)

Source of variation	SS	df	MS	$F_{\text{calc}}$	$F_{\text{crit}}$
between brands				6.551	
within brands	127.143				
total					

- b) Formulate the appropriate null hypothesis.
- c) Carry out the test. (Use a significance level of  $\alpha = 5\%$ .)
- d) How can  $SSG$  be computed from the data?
- e) Suggest a further variable which could be introduced to obtain a two-way ANOVA problem. Which additional data would be needed, which additional results could be obtained?