Research Methods 2

Week 12: Exercise Sheet 1

Question 1.

Download the macro ttestpow.mac from the main page for this week and save it in the manner outlined in Week 6. This macro can repeatedly generate two samples from Normal populations (which have a common SD) and performs an unpaired *t*-test to compare them. The user must specify the two population means, the common SD and the two sample sizes. The number of times this is done must also be specified. The output is in two columns, one holding the P-values and a second column which is 1 if the P-value is less than 0.05 and 0 otherwise. Thus the macro is invoked in the Session Window by the following call

```
MTB > %ttestpow 15 14 1 10 12 c1 c2 2000
```

This generates a sample from a Normal population with mean 15 (the first argument) with SD1 (the third argument) of size 10 (the fourth argument). It then generates a second sample from a population with mean 14 (the second argument) and the same SD as before; the size of this sample is 12 (the fifth argument). The two samples are then compared using an unpaired *t*-test. The whole process is executed 2000 times (last argument) and the 2000 P-values are stored in column C1 (sixth argument). Finally the seventh argument, column C2, holds a 0 if the corresponding row of C1 is less than 0.05 and 0 otherwise.

Enter the above line in the Session window. The macro gives a report after every 100 *t*-tests have been performed. Use the Tally command (**Stat** -> **Tables** -> **Tally...**) on column C2 to find out what proportion of the *t*-tests give P < 0.05.

Repeat the above with the SD (third argument) now set at 2, not 1. Comment.

You should also enter the command

```
MTB > %ttestpow 15 15 1 10 12 c5 c6 2000
```

What proportion of the *t*-tests are < 0.05 now? Explain.

Question 2

The following has been extracted from a paper on the use of oral morphine

"Statistical analyses
The sample size calculation was based on VAS (0-10 cm) for pain intensity, which was designated as the primary outcome measure. A sample size of 42 was determined to be sufficient to detect a difference of 1 cm with a [redacted] cm to provide 90 percent power at the [redacted] level."

{note that VAS stands for Visual Analogue Score (or Scale). It is a 10 cm line, with one end marked 'No pain' and the other marked something such as 'worst pain imaginable', and the patient is asked to mark a point on the line to indicate their level of pain}

What are the missing items that have been blanked out? (specific values cannot be discerned but you should be able to identify the quantities which still need to be specified)

End of Exercise Sheet 1