Research Methods 2

Week 7: Exercise Sheet 1

Question 1.

The following are the annual sex ratios (number of male births divided by number of female births) for live births to mothers resident in Seascale civil parish, for period 1950-83.

Year	1950	1951	1952	1953	1954	1955
Ratio	0.8	0.67	0.82	1.42	1.11	0.93

1956	1957	1958	1959	1960	1961	1962
0.67	0.79	1.56	1.25	1.19	1.39	1.4

1963	1964	1965	1966	1967	1968	1969
1.52	0.91	1.74	2.4	1.17	1	1.29

1970	1971	1972	1973	1974	1975	1976
1.14	0.76	0.85	0.8	1.2	0.82	0.47

1977	1978	1979	1980	1981	1982	1983
1.17	0.5	4	0.82	2.5	1.29	1.43

Enter the 34 ratios into a column in Minitab (it will probably be worth saving the worksheet – see Week 2). Find the mean and SE and use these to form a 95% confidence interval for the mean sex ratio (use the formula mean $\pm$ 2 $\times$ SE).

Repeat the exercise but using only the data from 1977-1983.

Question 2.

Find 95% confidence intervals for the mean sex ratio directly using Minitab's built in command. [Do you need a hint?].

Compare the intervals obtained with those found in question 1 and comment.

Question 3.

Download the macro *cicheck* from the main page for this week. Save the macro in the same way that you saved the macros in Week 6.

In the session window type the command

%cicheck 1.05 0.2 20 1000 c6 c7 c8 c9

As you see this macro has 8 arguments. The first four are numbers and the last four are columns. The arguments are given below.

First two numbers	Mean and SD of a Normal population
Third number	Sample size
Fourth number	Number of samples generated by macro
First column	Stores mean of sample
Second and third column	Lower and upper limits of 95% confidence interval for mean
Fourth column	Indicator column

The macro generates a sample from a Normal population. The population is specified by the first two numbers and the size of the sample by the third. It computes the mean and the 95% confidence interval for the mean. The mean is stored in the next available row of the first column you specify, and the lower and upper limits of the confidence interval are stored in the next two columns. If the population mean is contained within the confidence interval then a 1 is stored in the corresponding row of the final column: otherwise a 0 is stored there. The whole process is repeated until the number of samples specified by the fourth argument has been generated. The macro can run quite slowly on some computers, so as a check on progress, a message is printed after every 100 samples have been generated.

So the above command asks for 1000 samples of size 20 from the Normal population with mean 1.05 and SD 0.2. The mean of each sample is stored in C6, the 95% confidence intervals are in C7 and C8, and the indicator is in C9.

By using the macro and observing the final column, you can see how often the population mean is contained in the 95% confidence interval for the mean.

Having run the above command, find out how many 0s and 1s there are in the indicator column [remember the **Stat** -> **Tables** -> **Tally Individual Variables...** trail from Week 5]. Comment.

Repeat the exercise trying several different population means and SDs and also varying the sample size. (you should make the number of samples you generate is as large as the speed of you computer comfortably allows, and in any case do not allow it to fall below 500).

Question 4

What does the result in question 2 of analysing all 34 sex ratios tell you? Interpret the interval in a sentence.

End of Exercise Sheet 1