**MA4413 2013 Tutorial for Week 8 : Confidence intervals and Hypothesis testing**

**Question 1.**

An IT competency test, used for staff recruitment, is devised so as to give a normal distribution of scores with a mean of 100. A random sample of 49 experienced IT users who are given the test achieve a mean score of 121 with a standard deviation of 14.

1. Perform a hypothesis test to assess whether all such experienced IT Users is unusual (i.e. have a different mean from the general population).
2. Compute a 95% confidence interval for the group.

**Question 2.**

A claim has been made that the mean body temperature of healthy adults is ***equal*** to 98.6 degrees. Test this hypothesis using a 0.05 level significance, given the following information.

A sample of 121 people has produced a mean body temperature of 98.2 degrees and a standard deviation of 6.6 degrees.

**Question 3.**

The quality control manager at the Telektronic Company considers the production of telephone answering machines to be ’out of control’ when the overall rate of defects exceeds 6%.

Testing of a random sample of 150 machines revealed that 12 are defective. The production manager claims that production is not out of control and no corrective action is necessary.

1. Compute a 95% confidence interval for the rate of defective components
2. Use a 0.05 significance level to test the production manager’s claim.

(N.B. The Standard Error used in hypothesis testing is different to the one used for confidence intervals)

**Question 4.**

A manufacturer of computer monitors has, for many years, used a process giving a mean working life of 4700 hours for components.

A new process is tried to see if it will increase the life significantly. A sample of 100 monitors gave a mean life of 5000 hours, with a standard deviation of 1400 hours.

1. Compute a 95% confidence interval for the mean life of components built using the new process.
2. Does this new process make a difference at the 5% level of significance? (Perform a two tailed test, then a one tailed test)

**Question 5.**

In a study of store checkout scanners, 240 items were checked and 6 of those items were found to be “overcharges”.

* Use a 0.05 significance level to test the claim that with these scanners, 1.5 % of sales transactions are overcharges.

(N.B. The Standard Error used in hypothesis testing is different to the one used for confidence intervals)