MATH7501 Exercise sheet 9

1. A car manufacturer has to choose between two types of car tyres for a new model, and conducts tests using 9 tyres of type A and 11 of type B. Each tyre is used until it wears out and the total distance travelled is recorded. The results are

$$\begin{aligned} \text{Tyre A:} \quad & \bar{x}_A = 37900 \text{ km}; \quad s_A = 5100 \text{ km}. \\ \text{Tyre B:} \quad & \bar{x}_B = 39800 \text{ km}; \quad s_B = 5900 \text{ km}. \end{aligned}$$

   On the assumption that the tyre lifetimes are normally distributed, test the hypothesis that $\sigma_A = \sigma_B$ against the alternative that $\sigma_A \neq \sigma_B$, at the 5% significance level.

   Now, on the assumption that σ_A and σ_B *are* equal, test the hypothesis that there is no difference between the mean lifetimes for the two types of tyres. Also calculate a 95% confidence interval for the difference $\mu_A - \mu_B$. Explain how the test result can be connected to the confidence interval. **12 marks**

2. Eight children were each given a reading test before a new teaching method was introduced. After the method had been in use for a few weeks, the children were re-tested. The scores obtained were:

Child	1	2	3	4	5	6	7	8
Score on first test	78	74	63	66	68	63	77	65
Score on second test	83	74	67	64	70	67	81	64

   Do these data provide any evidence that the new teaching method makes a difference? State any assumptions that you make in analysing these data. Make any comments you think appropriate on the form of the experiment.

   8 marks