2. An experiment is conducted to compare the heat retention of two brands of flasks, brand A and brand B. Both brands of flask have a capacity of 750 ml.

In the experiment 750 ml of boiling water is poured into the flask, which is then sealed. Four hours later the temperature, in °C, of the water in the flask is recorded.

A random sample of 100 flasks from brand A gives the following summary statistics, where x is the temperature of the water in the flask after four hours.

$$\sum x = 7690 \qquad \sum (x - \bar{x})^2 = 669.24$$

(a) Find unbiased estimates for the mean and variance of the temperature of the water, after four hours, for brand A.

(3)

A random sample of 80 flasks from brand B gives the following results, where y is the temperature of the water in the flask after four hours.

$$\bar{y} = 75.9 \qquad s_y = 2.2$$

(b) Test, at the 1% significance level, whether there is a difference in the mean water temperature after four hours between brand A and brand B.
You should state your hypotheses, test statistic and critical value clearly.

(7)

(c) Explain why it is reasonable to assume that $\sigma^2 = s^2$ in this situation.

(1)

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