4: A biologist claims that the mean weight of grey squirrels is 200 grams more than the mean weight of red squirrels.

A research student believes that the mean weight of grey squirrels is greater than 200 grams more than the mean weight of red squirrels.

To test this, the research student collects and weighs a random sample of 80 grey squirrels and 80 red squirrels.

The results are summarised below, where

- x denotes the weights, in grams, of the grey squirrels
- y denotes the weights, in grams, of the red squirrels

$$\bar{x} = 500 \qquad s_x^2 = 1156 \qquad \sum y = 23\,200 \qquad \sum y^2 = 6\,741\,351$$

(a) Find an unbiased estimate of the mean and an unbiased estimate of the variance for the weights of the red squirrels.

(3)

(b) Stating your hypotheses clearly, carry out a suitable test to assess the research student's belief.
Use a 5% level of significance and state your critical value.

(7)

(c) State an assumption you have made in carrying out the test in part (b)

(1)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Question 4 continued

Question 4 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 4 continued

(Total for Question 4 is 11 marks)