11 In 2010 the heights of adult women in the UK were found to have mean $\mu = 161.6$ cm and variance $\sigma^2 = 1.96\,\text{cm}^2$.

It is believed that the mean height of adult women in 2020 in the UK is greater than in 2010.

In 2020 a researcher collected a random sample of the heights of 200 adult women in the UK.

The researcher calculated the sample mean height and carried out a hypothesis test at the 5% level to investigate whether there was any evidence to suggest that the mean height of adult women in the UK had increased.

The researcher assumed that the variance was unaltered.

(a) • State suitable hypotheses for the test, defining any variables you use.

  • Explain whether the researcher conducted a 1-tail or a 2-tail test. **[3]**

(b) Determine the critical region for the test. **[2]**

The researcher found that the sample mean was 161.9 cm and made the following statements.

• The sample mean is in the critical region.

• The null hypothesis is accepted.

• This proves that the mean height of adult women in the UK is unaltered at 161.6 cm.

(c) Explain whether each of these statements is correct. **[3]**