1. A study was made of adult men from region *A* of a country.
It was found that their heights were normally distributed with a mean of 175.4 cm and standard deviation 6.8 cm.

(a) Find the proportion of these men that are taller than 180 cm.

(1)

A student claimed that the mean height of adult men from region *B* of this country was different from the mean height of adult men from region *A*.

A random sample of 52 adult men from region *B* had a mean height of 177.2 cm

The student assumed that the standard deviation of heights of adult men was 6.8 cm both for region *A* and region *B*.

(b) Use a suitable test to assess the student's claim.
You should

- state your hypotheses clearly

- use a 5% level of significance

(4)

(c) Find the *p*-value for the test in part (b)

(1)

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a) Let r.v. X = height from region A

$$X \sim N(175.4, 6.8^2)$$

$$P(x > 180) = 0.2493\ldots = 0.249 \ (3 \text{ s.f.}) \ ①$$

b) Let r.v. Y = height from region B

$$\bar{Y} \sim N\left(175.4, \frac{6.8^2}{52}\right) \ ①$$

$$H_0 : \mu = 175.4, \quad H_1 : \mu \neq 175.4 \ ①$$

$$\therefore P(\bar{Y} > 177.2) = 0.0281\ldots \ ① \ > 0.025. \quad (\text{two-tailed, so } \alpha = 0.025)$$

$\therefore$ do not reject H_0 as there is insufficient
evidence to support student's claim. ①

c) $p = 2 \times 0.0281\ldots$

$= 0.05628,\ldots$ (1)