

The times taken to run 400 metres by students at two large colleges  $P$  and  $Q$  are being compared. There is no evidence that the population variances are equal. The time taken by a student at college  $P$  and the time taken by a student at college  $Q$  are denoted by  $x$  seconds and  $y$  seconds respectively. A random sample of 50 students from college  $P$  and a random sample of 60 students from college  $Q$  give the following summarised data.

$$\Sigma x = 2620 \quad \Sigma x^2 = 138\,200 \quad \Sigma y = 3060 \quad \Sigma y^2 = 157\,000$$

- (i) Using a 10% significance level, test whether, on average, students from college  $P$  take longer to run 400 metres than students from college  $Q$ . [9]
- (ii) Find a 90% confidence interval for the difference in the mean times taken to run 400 metres by students from colleges  $P$  and  $Q$ . [3]