

A company is deciding which of two machines,  $X$  and  $Y$ , can make a certain type of electrical component more quickly. The times taken, in minutes, to make one component of this type are recorded for a random sample of 8 components made by machine  $X$  and a random sample of 9 components made by machine  $Y$ . These times are as follows.

Machine $X$	4.0	4.6	4.7	4.8	5.0	5.2	5.6	5.8	
Machine $Y$	4.5	4.9	5.1	5.3	5.4	5.7	5.9	6.3	6.4

The manager claims that on average the time taken by machine  $X$  to make one component is less than that taken by machine  $Y$ .

- (a) Carry out a Wilcoxon rank-sum test at the 5% significance level to test whether the manager's claim is supported by the data. [6]
- (b) Assuming that the times taken to produce the components by the two machines are normally distributed with equal variances, carry out a  $t$ -test at the 5% significance level to test whether the manager's claim is supported by the data. [9]
- (c) In general, would you expect the conclusions from the tests in parts (a) and (b) to be the same? Give a reason for your answer. [1]