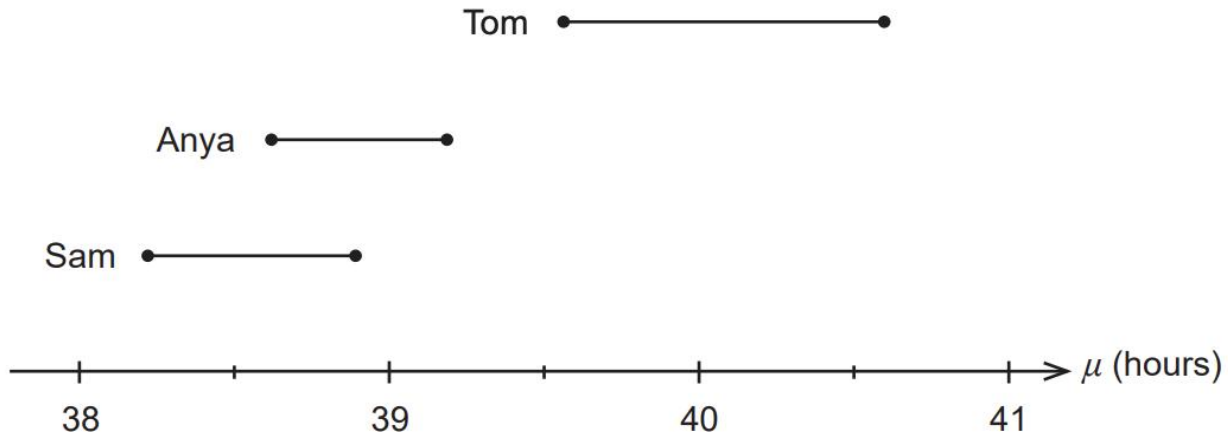
Question 16 **(9 marks)**

Tom wants to estimate the population mean number of hours, μ, worked by Australians per week. He takes a random sample of 400 workers and determines a 99% confidence interval for μ. The upper limit of this interval is 40.62 hours and the width of this interval is 1.08 hours.

(a) Determine the sample mean for this sample of 400 workers. (2 marks)

(b) Calculate, correct to 0.01 hours, the sample standard deviation for the sample of 400 workers. (3 marks)

Two of Tom's colleagues, Anya and Sam, each take different random samples of size 400 and similarly determine 99% confidence intervals for the population mean μ. These confidence intervals, together with Tom's, are shown below.



(c) Anya makes the following statements based on these confidence intervals. Indicate **why** each of her statements is true or false.

(i) 'Tom's sample has a larger standard deviation compared with that of Sam's and mine.' (1 mark)

(ii) 'Tom's method of sampling must be biased since his confidence interval does not overlap with mine or Sam's.' (1 mark)

(d) Which of these three confidence intervals contains the value for μ? Justify your answer.

(2 marks)