4. A company has a customer services call centre. The company believes that the time taken to complete a call to the call centre may be modelled by a normal distribution with mean 16 minutes and standard deviation σ minutes.

Given that 10% of the calls take longer than 22 minutes,

(a) show that, to 3 significant figures, the value of σ is 4.68

(3)

(b) Calculate the percentage of calls that take less than 13 minutes.

(1)

A supervisor in the call centre claims that the mean call time is less than 16 minutes. He collects data on his own call times.

- 20% of the supervisor's calls take more than 17 minutes to complete.
- 10% of the supervisor's calls take less than 8 minutes to complete.

Assuming that the time the supervisor takes to complete a call may be modelled by a normal distribution,

(c) estimate the mean and the standard deviation of the time taken by the supervisor to complete a call.

(6)

(d) State, giving a reason, whether or not the calculations in part (c) support the supervisor's claim.

(1)