

5. A machine puts liquid into bottles of perfume. The amount of liquid put into each bottle,  $D$  ml, follows a normal distribution with mean 25 ml

Given that 15% of bottles contain less than 24.63 ml

- (a) find, to 2 decimal places, the value of  $k$  such that  $P(24.63 < D < k) = 0.45$

(5)

A random sample of 200 bottles is taken.

- (b) Using a normal approximation, find the probability that fewer than half of these bottles contain between 24.63 ml and  $k$  ml

(3)

The machine is adjusted so that the standard deviation of the liquid put in the bottles is now 0.16 ml

Following the adjustments, Hannah believes that the mean amount of liquid put in each bottle is less than 25 ml

She takes a random sample of 20 bottles and finds the mean amount of liquid to be 24.94 ml

- (c) Test Hannah's belief at the 5% level of significance.  
You should state your hypotheses clearly.

(5)