4. (a) Given n is large, state a condition for which the binomial distribution B(n, p) can be reasonably approximated by a Poisson distribution.

(1)

A manufacturer produces candles. Those candles that pass a quality inspection are suitable for sale.

It is known that 2% of the candles produced by the manufacturer are not suitable for sale.

A random sample of 125 candles produced by the manufacturer is taken.

(b) Use a suitable approximation to find the probability that no more than 6 of the candles are **not** suitable for sale.

(4)

The manufacturer also produces candle holders.

Charlie believes that 5% of candle holders produced by the factory have minor defects.

The manufacturer claims that the true proportion is less than 5%

To test the manufacturer's claim, a random sample of 30 candle holders is taken and none of them are found to contain minor defects.

(c) (i) Carry out a test of the manufacturer's claim using a 5% level of significance. You should state your hypotheses clearly.

(5)

(ii) Give a reason why this is **not** an appropriate test.

(1)

Ashley suggests changing the sample size to 50

(d) Comment on whether or not this change would make the test appropriate. Give a reason for your answer.

(2)

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Question 4 continued

(Total for Question 4 is 13 marks)