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This image shows a full page of blank, lined paper. It features approximately 20 evenly spaced horizontal gray lines across its entire width, providing a guide for handwriting or typing. The background is a clean, solid white color.

3. Brad planted 25 seeds in his greenhouse. He has read in a gardening book that the probability of one of these seeds germinating is 0.25. Ten of Brad's seeds germinated. He claimed that the gardening book had underestimated this probability. Test, at the 5% level of significance, Brad's claim. State your hypotheses clearly.

(7)

(2)

In the production of a certain electronic component it is found that 10% are defective.

The component is produced in batches of 20.

(b) Write down a suitable model for the distribution of defective components in a batch.

(1)

Find the probability that a batch contains

(c) no defective components,

(2)

(d) more than 6 defective components.

(2)

(e) Find the mean and the variance of the defective components in a batch.

(2)

A supplier buys 100 components. The supplier will receive a refund if there are more than 15 defective components.

(f) Using a suitable approximation, find the probability that the supplier will receive a refund.

(4)

4. continued

The number of breakdowns per day in a large fleet of hire cars has a Poisson distribution with mean $\frac{1}{7}$.

- (b) Find the probability that on a particular day there are fewer than 2 breakdowns. (3)
- (c) Find the probability that during a 14-day period there are at most 4 breakdowns. (3)

The cars are maintained at a garage. The garage introduced a weekly check to try to decrease the number of cars that break down. In a randomly selected 28-day period after the checks are introduced, only 1 hire car broke down.

- (d) Test, at the 5% level of significance, whether or not the mean number of breakdowns has decreased. State your hypotheses clearly. (7)

(b) exactly 2 defects, (3)

(c) more than 5 defects.

(3)

(d) Using a suitable approximation, find the probability that this total area of carpet contains 22 or more defects.

(6)

7. continued

END

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