2. On Friday evenings, a shop opens from 7 pm to 11 pm. During this time customers are known to enter the shop at a mean rate of 20 per hour.

(a) State a suitable distribution to model the number of customers that enter this shop in a 30-minute interval on Friday evenings.

(1)

(b) State a necessary assumption for the model in part (a) to be valid.

(1)

The manager makes alterations to the shop's layout.

Following these alterations, the manager wants to find out whether the mean rate of customers entering the shop has changed.

To test this, the manager decides to monitor the number of customers entering the shop the following Friday. The manager randomly selects a 30-minute interval between 7 pm and 11 pm.

(c) Write down suitable null and alternative hypotheses that the manager should use.

(1)

(d) Using a 3% level of significance, find the critical region for the manager's test.

(3)

(e) Find the actual significance level of this test based on your critical region from part (d)

(2)

During the 30-minute interval that the manager monitored, 16 customers entered the shop.

(f) Comment on this finding in the light of your critical region found in part (d)

(2)

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