1. The manager of a supermarket is investigating the number of complaints per day received from customers.

A random sample of 180 days is taken and the results are shown in the table below.

Number of complaints per day	0	1	2	3	4	5	6	$\geqslant 7$
Frequency	12	28	37	38	29	17	19	0

(a) Calculate the mean and the variance of these data.

(3)

(b) Explain why the results in part (a) suggest that a Poisson distribution may be a suitable model for the number of complaints per day.

(1)

The manager uses a Poisson distribution with mean 3 to model the number of complaints per day.

(c) For a randomly selected day find, using the manager's model, the probability that there are

(i) at least 3 complaints,

(ii) more than 4 complaints but less than 8 complaints.

(4)

A week consists of 7 consecutive days.

(d) Using the manager's model and a suitable approximation, show that the probability that there are less than 19 complaints in a randomly selected week is 0.29 to 2 decimal places.
Show your working clearly.
(*Solutions relying on calculator technology are not acceptable.*)

(5)

A period of 13 weeks is selected at random.

(e) Find the probability that in this period there are exactly 5 weeks that have less than 19 complaints.
Show your working clearly.

(3)

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Question 1 continued

(Total for Question 1 is 16 marks)