5. A meteor shower occurs for several weeks every summer. One Monday night during this meteor shower, Chris goes out to look for meteors and sees an average of 15 meteors per hour.

(a) Find the probability that in a random 20-minute period of time on this Monday night Chris sees

(i) at least 6 meteors

(ii) no more than 3 meteors.

(4)

Chris is told by the local astronomy club that there will be more meteors to be seen per hour on the following Friday night than on Monday night.

Chris decides to use data from the Friday night to test, at a 5% significance level, if there is evidence to support the claim of the local astronomy club.

Chris plans to spend 30 minutes looking for meteors on the Friday night.

(b) Write down suitable null and alternative hypotheses that Chris can use.

(1)

(c) Find the critical region for the test and state its associated probability.

(3)

On the Friday night, Chris sees 12 meteors in the 30 minutes.

(d) State the conclusion to the test that can be made using this observation. Give a reason for your answer.

(2)

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Question 5 continued

(Total for Question 5 is 10 marks)