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Answer ALL questions. Write your answers in the spaces provided.

1. A company produces NuttyChok bars that are made of chocolate and whole hazelnuts.

A 40 kg batch of the chocolate and hazelnut mixture used to make NuttyChok bars will contain 4750 hazelnuts.

(a) Show that the mean number of hazelnuts in an 80 g bar of NuttyChok is 9.5

(1)

A Poisson model is suggested for the number of hazelnuts in each 80 g bar of NuttyChok.

(b) State two assumptions that need to be made for a Poisson model to be suitable in this case.

(2)

(c) Find the probability that an 80 g bar of NuttyChok

(i) contains exactly 12 hazelnuts,

(ii) contains fewer than 8 hazelnuts.

(4)

(d) Find the probability that a pack of three 80 g bars of NuttyChok includes exactly one bar with fewer than 8 hazelnuts.

(3)

The company also produces a 200 g bar of NuttyChok using the same chocolate and hazelnut mixture.

(e) Use a suitable approximation to find the probability that a 200 g bar of NuttyChok contains at least 30 hazelnuts.

(5)

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Question 1 continued

(Total 15 marks)

Q1