3 Eggs in a supermarket are sold in boxes of six. A supermarket manager wishes to model the number of broken eggs in the boxes sold in the store. A random sample of 2000 boxes is taken and the number of broken eggs recorded. The observed frequencies are shown in the table below.

Number of broken eggs	0	1	2	3	4	5	6
Observed frequency	1844	143	11	0	1	0	1

(a) Use the data to estimate the probability that an egg is broken. Give your answer correct to 4 significant figures. [1]

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It is decided to carry out a goodness of fit test at the 0.5% significance level to determine whether a binomial distribution fits the data.

The observed frequencies and the expected frequencies are given in the following table.

Number of broken eggs	0	1	2	3	4	5	6
Observed frequency	1844	143	11	0	1	0	1
Expected frequency	1831.3	a	6.016	0.119	0.001	0.000	0.000

(b) Show that $a = 162.6$ correct to 1 decimal place. [1]

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(c) Carry out a goodness of fit test at the 0.5% level of significance to test whether a binomial distribution is a satisfactory model for the data. [5]

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(d) Give a reason why a binomial distribution may not be a suitable model in this situation. [1]

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