4. A company produces a certain type of mug. The masses of these mugs are normally distributed with mean μ and standard deviation 1.2 grams. A random sample of 5 mugs is taken and the mass, in grams, of each mug is measured. The results are given below.

229.1 229.6 230.9 231.2 231.7

(a) Find a 95% confidence interval for μ, giving your limits correct to 1 decimal place.

(4)

Sonia plans to take 20 random samples, each of 5 mugs. A 95% confidence interval for μ is to be determined for each sample.

(b) Find the probability that more than 3 of these intervals will not contain μ.

(3)

(Total for Question 4 is 7 marks)

5. Jeff records the number of births announced in his local weekly newspaper each week for n consecutive weeks, where n is an integer. He decides the resulting data can be modelled as independent samples from a Poisson distribution with mean 2.8 and calculates the expected frequencies using this model.

The following table shows the observed frequencies and the expected frequencies, to 2 decimal places.

The observed and expected frequencies for 5 births are not given.

Number of births	Observed frequency (O)	Expected frequency (E)
0	8	5.84
1	27	16.35
2	25	22.88
3	16	21.36
4	12	14.95
5	a	b
6	2	3.91
$\geqslant 7$	1	2.34

(a) Find the value of a and the value of b

(2)

The value of $\sum \frac{(O-E)^2}{E}$ for the given values for the number of births 0, 1, 2, 3 and 4 is 9.86

(b) Using a 5% significance level, test whether or not this Poisson model is suitable. Show your working clearly, stating your hypotheses, test statistic and critical value.

(7)

(Total for Question 5 is 9 marks)