

Roberto owns a small hotel and offers accommodation to guests. Over a period of 100 nights, the numbers of rooms, x , that are occupied each night at Roberto's hotel and the corresponding frequencies are shown in the following table.

Number of rooms occupied (x)	0	1	2	3	4	5	6	≥ 7
Number of nights	4	9	18	26	20	16	7	0

- (i) Show that the mean number of rooms that are occupied each night is 3.25. [1]

The following table shows most of the corresponding expected frequencies, correct to 2 decimal places, using a Poisson distribution with mean 3.25.

Number of rooms occupied (x)	0	1	2	3	4	5	6	≥ 7
Observed frequency	4	9	18	26	20	16	7	0
Expected frequency	3.88	12.60	20.48	22.18	18.02	11.72		

- (ii) Show how the expected value of 22.18, for $x = 3$, is obtained and find the expected values for $x = 6$ and for $x \geq 7$. [4]
- (iii) Use a goodness-of-fit test at the 5% significance level to determine whether the Poisson distribution is a suitable model for the number of rooms occupied each night at Roberto's hotel. [7]