

1. Tejinder is the deputy manager of a nursery in Gillington. She is interested in the distance parents travel to bring their children to the nursery. She takes a random sample of 40 parents and asks them to fill in a form, stating the distance they travel from home to the nursery. Her results are summarised in the table below:

Distance (m)	<1	1≤d<2	2≤d<3	3≤d<4	4≤
	16	8	7	4	5

Tejinder decided to use a Chi-squared test to determine whether a normal distribution would provide a suitable model for the distances travelled by customers. Carry out Tejinder's Chi-squared test at the 5% significance level. (Based on S5 2016)

2. Rayson Inc make toilet paper. Gemma, the company statistician, decided to check whether the lengths of Rayson Inc toilet paper are normally distributed and produces the following table

Length (cm)	Frequency
$l < 10.5$	22
$10.5 \leq l < 11$	48
$11 \leq l < 11.5$	53
$11.5 \leq l < 12$	36
$12 \leq l$	19

- a. Obtain estimates of the population mean and standard deviation from the sample
- b. Use the χ^2 distribution, at the 5% significance level, to test whether the normal distribution provides an adequate model for the data.

3. A sample of 120 tea lights are taken from a factory in Roderson. To ensure quality control of the candles' burn time is accurate, it is assumed that said burn time follows an exponential distribution. On behalf of the company, the sample of candles are lit and the time, in minutes, for them to burn out are measured with the following results.

Time (mins)	0-120	121-240	241-300	301-360	361-420	421+
Frequency	3	16	37	32	27	5

Test the hypothesis that the lifetimes of the tea lights follow an exponential distribution.

4. It is claimed that the time it takes for a particular drug to eliminate the symptoms of a 'Hypnic' headache follow an exponential distribution. If so, this would help with making of decisions with regards to distribution of the drug after successfully completing the necessary trials. The table below shows the time declared by a sample of 60 patients from taking the drug and, in their opinion, they symptoms being eliminated.

Time (mins)	0<x≤30	30<x≤60	60<x≤120	120<x≤180	180<x
Frequency	3	19	17	18	3

Use a Chi-squared test to see if the claim of the time taken for the drug to eliminate the symptoms of a 'Hypnic' headache is exponentially distributed are true.