Chapter 14 / **Example 3**

Test for the mean of a Poisson distribution

The number of cars passing a school between 1 pm and 1.30 pm on a weekday can be modelled by a Poisson distribution with a mean of 32. A set of traffic lights is installed at one end of the road and it is hoped this will reduce the number of cars that use the road. A teacher records the number of cars (X) that pass between 1 pm and 1.30 pm on five days during a school week.

a Find the critical region for a test at the 5% level.

b If the total number of cars is 140, state if there is there evidence at the 5% level that the number of cars has been reduced.

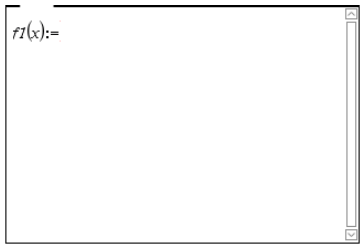
c Find the p-value for a test statistic of 140 cars and use it to verify your conclusion in part **b**.

H_0: $\mu = 160$, H_1: $\mu < 160$

$X \sim Po\ 160$ Find $P(X \leq r) \leq 0.05$

Open a new document and add a Calculator page.

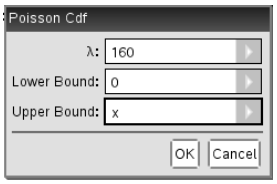
Type $f1(x)$ and press ctrl :=.



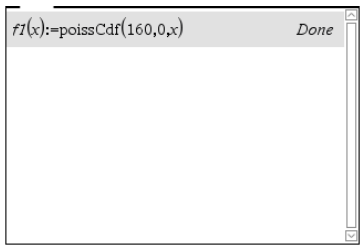
Press menu 5:Probability | 5:Distributions | K:Poisson Cdf…

Enter 160 as the value of λ, 0 as the Lower Bound and x as the Upper Bound.

Press enter or click OK with the touchpad.



The function $f1(x)$ is defined.

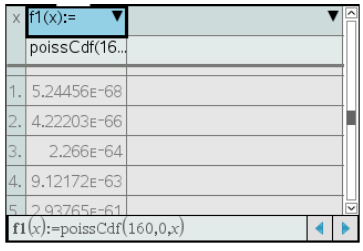


Add a new Lists & Spreadsheet page to your document by pressing ctrl doc (+page) 4:Add Lists & Spreadsheet

Press ctrl T to switch from a spreadsheet to a table.

Press enter to select the function $f1(x)$.

The function is shown in the table.



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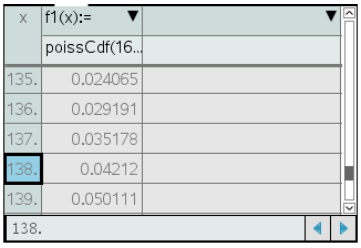
Scroll down the table using ▼.

From the table, $P(X \leq 138) > 0.0421$ and $P(X \leq 139) > 0.0501$.

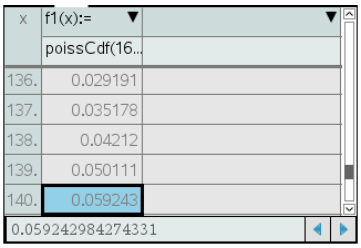
The critical region is $X \leq 138$

140 is not in the critical region so we do not reject the null hypothesis.



P(X ≤ 140) = 0.0592

0.0592 > 0.05, so not significant. Therefore, there is insufficient evidence at the 5% level to reject H_0.



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