

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.

- Find the critical region for a test at the 5% level.
- 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.
- Find the p -value for a test statistic of 140 cars and use it to verify your conclusion in part b.

Press **MENU** 7 **TABLE**.

Press **F5** SET and change the settings so that the table starts from 130 and ends at 150.

Press **EXIT**.

Table Setting
X

Start: 130
End : 150
Step : 1

Press **OPTN** **F6** \triangleright **F3** STAT **F1** DIST **F6** \triangleright **F1** POISSON **F2** Pcd

Enter 0 as Lower and x as Upper and 160 as λ , separated by commas. Close the parentheses and press **EXE**.

Table Func : Y=
Y1=PoissonCD(0,x[—]
Y2: [—]
Y3: [—]
Y4: [—]
Y5: [—]
Y6: [—]
[SELECT] [DELETE] [TYPE] [STYLE] [SET] [TABLE]

Press **F6** TABLE

The function is shown in the table.

X	Y1
130	8.2E-3
131	0.0103
132	0.0129
133	0.016

130
[FORMULA] [DELETE] [ROW] [EDIT] [GPH-CON] [GPH-PLT]

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.

X	Y1
136	0.0291
137	0.0351
138	0.0421
139	0.0501

138
[FORMULA] [DELETE] [ROW] [EDIT] [GPH-CON] [GPH-PLT]

$P(X \leq 140) = 0.0592$

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

Y1=PoissonCD(0,x,160)
X Y1
137 0.0351
138 0.0421
139 0.0501
140 0.0592
0.05924298422
[FORMULA] [DELETE] [ROW] [EDIT] [GPH-CON] [GPH-PLT]