

Chapter 13 / Example 6

Poisson probabilities

- a** Assume that the number of goals scored in a football match can be modelled by the Poisson distribution with parameter 2.9. Let G be the number of goals in a particular match.
Find:
- i** $P(G = 4)$ **ii** $P(G \leq 3)$ **iii** $P(G \geq 4)$
- b** Let L be the number of goals scored in five matches. Write down the distribution of L and use it to find $P(L \leq 10 \mid L \geq 2)$.

$G \sim Po(2.9)$. Find $P(G = 4)$.

Press **MENU** 2 **STAT** to display the List Editor screen.

Press **F5** DIST **F6** \triangleright **F1** POISSON **F1** Ppd.

Choose **F2** Var.

Enter 4 as the value of x and 2.9 as λ .

Choose **F1** None for Save Res.

```
Poisson P.D
Data      :Variable
x         :4
λ         :2.9
Save Res:None
Execute
[None] LIST
```

Navigate down to Execute and press **EXE**.

The GDC displays the solution $P(G = 4) = 0.162$.

```
Poisson P.D
p=0.16215365
```

Press **EXIT** twice to display the List Editor screen.

Press **F5** DIST **F6** \triangleright **F1** POISSON **F2** Pcd.

Choose **F2** Var.

Enter 0 as Lower and 3 as Upper and 2.9 as λ .

Choose **F1** None for Save Res.

```
Poisson C.D
Data      :Variable
Lower     :0
Upper     :3
λ         :2.9
Save Res:None
Execute
[None] LIST
```

Navigate down to Execute and press **EXE**.

The GDC displays the solution $P(G \leq 3) = 0.670$.

```
Poisson C.D
p=0.66962341
```

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Press **EXIT** to display the Poisson CD template.

Choose **F2** Var.

Enter 4 as Lower and 100 as Upper and 2.9 as λ .

100 is a large value of L used in place of ∞ .

Choose **F1** None for Save Res.

```
Poisson C.D
Data :Variable
Lower :4
Upper :100
λ :2.9
Save Res:None
Execute
[None] LIST
```

Navigate down to Execute and press **EXE**.

The GDC displays the solution $P(G \leq 3) = 0.670$.

```
Poisson C.D
p=0.33037658
```

$L \sim Po(14.5)$. Find $\frac{P(2 \leq L \leq 10)}{P(L \geq 2)}$.

Press **EXIT** to display the Poisson CD template.

Choose **F2** Var.

Enter 2 as Lower and 10 as Upper and 14.5 as λ .

Choose **F2** List for Save Res, type 1 and press **EXE**.

```
Poisson C.D
Data :Variable
Lower :2
Upper :10
λ :14.5
Save Res:List1
Execute
[None] LIST
```

Navigate down to Execute and press **EXE**.

The GDC displays the solution $P(2 \leq L \leq 10) = 0.145$.

```
Poisson C.D
p=0.14485297
```

Press **EXIT** to display the Poisson CD template.

Choose **F2** Var.

Enter 2 as Lower and 100 as Upper and 14.5 as λ .

Choose **F2** List for Save Res, type 2 and press **EXE**.

```
Poisson C.D
Data :Variable
Lower :2
Upper :100
λ :14.5
Save Res:List2
Execute
[None] LIST
```

Navigate down to Execute and press **EXE**.

The GDC displays the solution $P(L \geq 2) = 0.999...$

```
Poisson C.D
p=0.99999218
```

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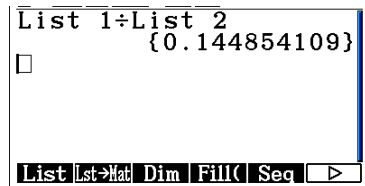
Press **MENU** 1 **Run-Mat** to display the Run-Matrix screen for arithmetical calculations.

Press **OPTN** **F1** LIST **F1** List and type 1.

Press **÷** **.**

Press **F1** List, type 2 and press **EXE**.

$P(L \leq 10 | L \leq 2) = 0.145$.



The image shows the Run-Matrix screen of a Casio fx-CG50 calculator. The top line displays 'List 1 ÷ List 2' followed by the result '{0.144854109}'. Below this, there is a small square icon. At the bottom, a menu bar shows options: 'List', 'List', 'Mat', 'Dim', 'Fill', 'Seq', and a right arrow.