

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 **2nd** **vars** (**[distr]**) C:poissonpdf(.

Enter 2.9 as λ and 4 as the x value.

Navigate down to Paste and press **enter**.

```
Poissonpdf
λ:2.9
x value:4
Paste
```

Press **enter**.

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

```
Poissonpdf(2.9,4)
.....1621536588
```

Press **2nd** **vars** (**[distr]**) D:poissoncdf(.

Enter 2.9 as λ and 3 as the x value.

Navigate down to Paste and press **enter**.

```
Poissoncdf
λ:2.9
x value:3
Paste
```

Press **enter**.

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

```
Poissonpdf(2.9,4)
.....1621536588
Poissoncdf(2.9,3)
.....6696234179
```

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The Poisson CDF function on the TI-84 Plus C finds the probability that G is less or equal to the given value.

To find $P(G \geq 4)$ calculate $1 - P(G \leq 3)$.

Type 1 - and press **2nd** **vars** (**[distr]**) D:poissoncdf(.

Enter 2.9 as λ and 3 as the x value.

Navigate down to Paste and press **enter**.

```
Poissoncdf
λ:2.9
x value:3
Paste
```

Press **enter**.

The GDC displays the solution $P(G \geq 4) = 0.330$.

```
PoissonPdf(2.9,4)
.1621536588
Poissoncdf(2.9,3)
.6696234179
1-Poissoncdf(2.9,3)
.3303765821
```

$L \sim Po(14.5)$. Find $\frac{P(2 \leq L \leq 10)}{P(L \geq 2)} = \frac{P(L \leq 10) - P(L \leq 1)}{1 - P(L \leq 1)}$.

Enter the fraction template by pressing **ALPHA** **[f1]** 1:n/d.

Enter the Poisson CDF functions using **2nd** **vars** (**[distr]**) D:poissoncdf(.

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

```
PoissonPdf(2.9,4)
.1621536588
Poissoncdf(2.9,3)
.6696234179
1-Poissoncdf(2.9,3)
.3303765821
Poissoncdf(14.5,10)-Poissoncdf(14.5,1)
1-Poissoncdf(14.5,1)
.144854109
```