Chapter 13 / **Example 7**

Calculating probabilities

Trains at a busy railway station are occasionally cancelled due to staff shortages, breakdowns, a lack of available trains and many other causes. Assume that there are on average 2.31 cancelled trains per day and that the number of cancelled trains C can be modelled by $C \sim \text{Po}(2.31)$.

a Find the probability that there will be 4 or more cancellations on a given day.

b Find the probability that there will be at least 81 cancellations in the month of March.

c Find, in two different ways, the probability that there are no cancellations in a working week of five days.

d In a working week of five days, find the probability that there will be 4 or more cancellations on exactly 3 of these days.

$C \sim Po(2.31)$. Find $\text{P}(C \geq 4)$.

Press [MENU] 2 [STAT] to display the List Editor screen.

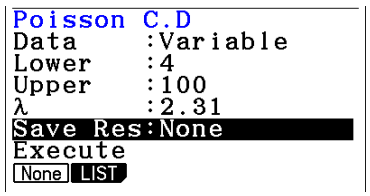
Press [F5] DIST [F6] ▷ [F1] POISSON [F2] Pcd.

Choose [F2] Var.

Enter 4 as Lower and 100 as Upper and 2.31 as λ.

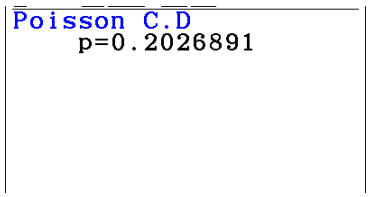
100 is a large value of C used in place of ∞.

Choose [F1] None for Save Res.



Navigate down to Execute and press [EXE].

The GDC displays the solution $\text{P}(C \geq 4) = 0.203$.



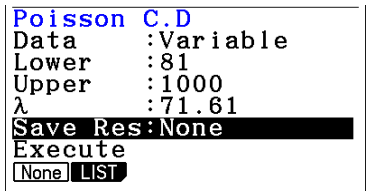
$M \sim Po(71.61)$. Find $\text{P}(M \geq 81)$.

Press [EXIT] to display the Poisson CD template.

Enter 81 as Lower and 1000 as Upper and 71.61 as λ.

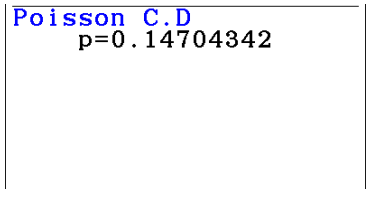
1000 is a large value of C used in place of ∞.

Choose [F1] None for Save Res.



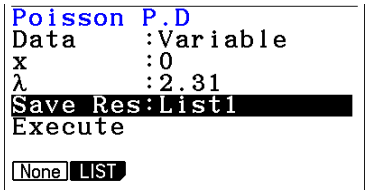
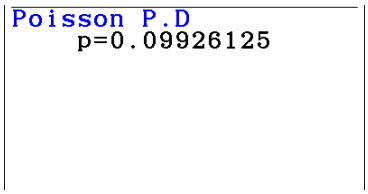
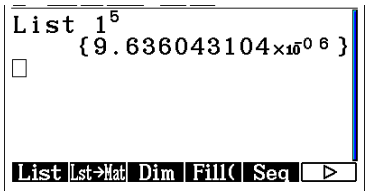
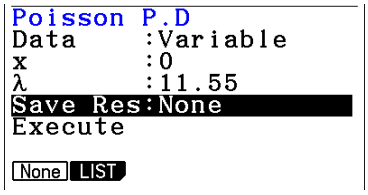
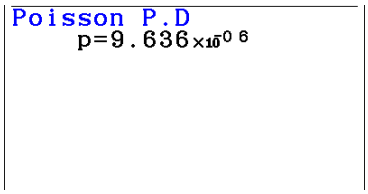
Navigate down to Execute and press [EXE].

The GDC displays the solution $\text{P}(M \geq 81) = 0.147$.



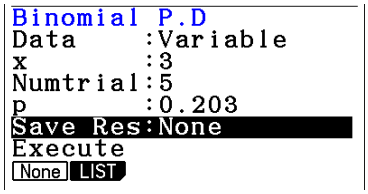
Chapter 13 / **Example 7**

Calculating probabilities

$C \sim Po(2.31)$. Find $(\mathrm{P}(C = 0))^5$. Press [EXIT] twice to display the List Editor screen. Press [F5] DIST [F6] ▷ [F1] POISSON [F1] Ppd. Choose [F2] Var. Enter 0 as the value of x and 2.31 as λ. Choose [F2] List for Save Res, type 1 and press [EXE].	
Navigate down to Execute and press [EXE]. The GDC displays the solution $\mathrm{P}(C = 0) = 0.0993$.	
Press [MENU] 1 to display the Run-Matrix screen for arithmetical calculations. Press [OPTN] [F1] LIST [F1] List and type 1. Type ^5. The GDC displays the solution $(\mathrm{P}(C = 0))^5 = 0.00000964$.	
$W \sim Po(11.55)$. Find $\mathrm{P}(W = 0)$. Press [MENU] 2 to display the List Editor screen. Press [F5] DIST [F6] ▷ [F1] POISSON [F1] Ppd. Choose [F2] Var. Enter 0 as the value of x and 11.55 as λ. Choose [F1] None for Save Res.	
Navigate down to Execute and press [EXE]. The GDC displays the solution $\mathrm{P}(W = 0) = 0.00000964$.	

Chapter 13 / **Example 7**

Calculating probabilities

$D \sim \mathrm{B}(5,\ 0.203)$. Find $\mathrm{P}(D = 3)$. Press [EXIT] twice to display the List Editor screen. Press [F5] DIST [F5] BINOMIAL [F1] Bpd. Choose [F2] Var. Enter 3 as the value of x, 5 as Numtrial and 0.203 as p. Choose [F1] None for Save Res.	
Navigate down to Execute and press [EXE]. $\mathrm{P}(D = 3) = 0.0531$.