Chapter 11 / **Example 25**

Euler's method

Use Euler's method with step size 0.1 to approximate the solution to the initial value problem $\frac{dy}{dx} = xy$ and $y(1) = 1$, and estimate the value of $y(2)$.

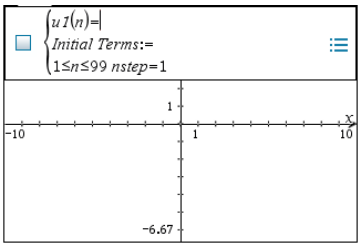
Open a new document and add a Graphs page.

The entry line is displayed at the top of the work area.

The default graph type is function, so '*f1*(*x*)=' is displayed.

Press menu 3:Graph Entry/Edit | 7:Sequence | 1:Sequence

'*u1*(*n*)=' is now displayed.



The TI-Nspire CX uses *u1* and *u2* in place of *x* and *y*.

$x_n = x_{n-1} + 0.1$

Set *u1*(*n*) to *u1*(*n*-1) + 0.1.

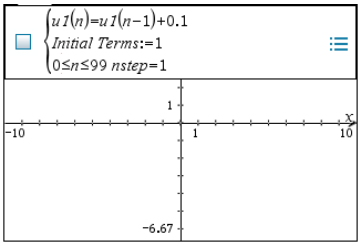
Since an iterative formula defines each term in terms of the previous one, you must enter the first term, u1(0).

Set *Initial Terms* to 1.

Since the boundary condition is x_0, y_0, the minimum value of *n* is 0.

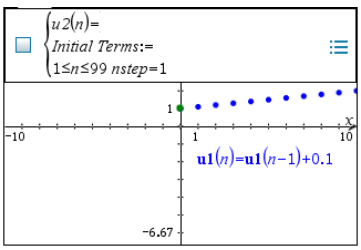
Edit the final expression to show $0 \le n \le 99$ *nstep* $= 1$.

Press enter.



The GDC displays a graph of the sequence with the default axes.

Press tab to display the entry line again. This time '*u2*(*n*)=' is displayed.

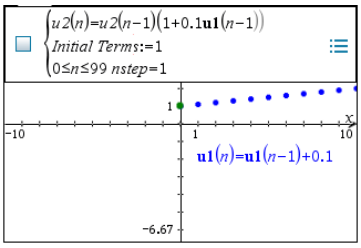


Set *u2*(*n*) to *u2*(*n*-1) (1 + 0.1 *u1*(*n*-1)).

Set *Initial Terms* to 1.

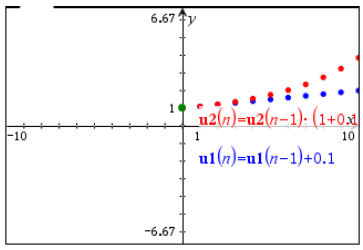
Edit the final expression to show $0 \le n \le 99$ *nstep* $= 1$.

Press enter.



Chapter 11 / **Example 25**

Euler's method

The GDC displays a graph of both sequences with the default axes. Press ctrl T.	
A table of values is displayed alongside the graph. Scroll down the table using ▼. From the table, $y\ 2\ = 3.86$.