

Chapter 11 / **Example 3****Area between a curve and the x-axis**

Consider the area A of the region enclosed between the curve $y = -x(x-3)$ and the x -axis.

- a** Write down the definite integral that represents this area A .
b Find A .

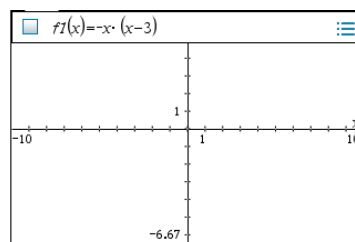
Open a new document and add a Graphs page.

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

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

The default axes are $-10 \leq x \leq 10$ and $-6.67 \leq y \leq 6.67$.

Type $-x \times x - 3$ and press **enter**.

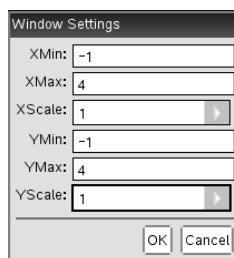


Press **menu** 4:Window/Zoom | 1:Window Settings...

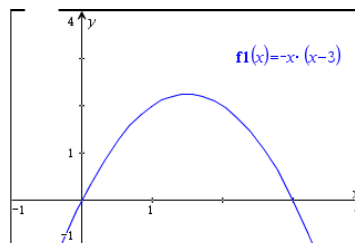
Set the axes to show $-1 \leq x \leq 4$ and $-1 \leq y \leq 4$

Set the scales set to 1.

Press **enter** when you have finished.



The GDC now displays the function $f1(x) = -x \cdot x - 3$

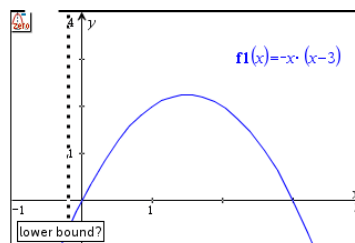


To find the zeros press **menu** 6:Analyze Graph | 1:Zero

You will need to give the lower and upper bounds of the region that includes the zero.

The GDC shows a line and asks you to set the lower bound. Move the line using the touchpad and choose a position to the left of the zero.

Click the touchpad.



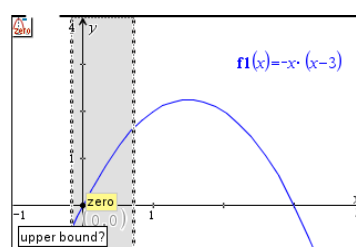
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The GDC shows another line and asks you to set the upper bound.

Use the touchpad to move the line so that the region between the lower and upper bounds contains the zero.

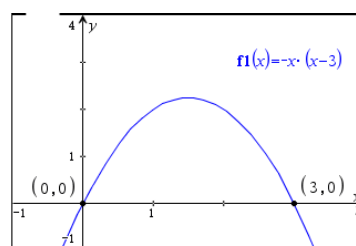
When the region contains the zero, the calculator will display the word 'zero' in a box.

Click the touchpad.



Repeat for the second zero.

The GDC displays the zeros at $(0,0)$ and $(3,0)$.

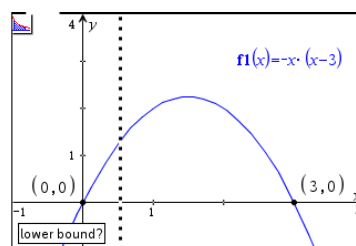


The area $A = \int_0^3 -x(x-3) dx$

To find the integral press **menu** 6:Analyze Graph | 6:Integral

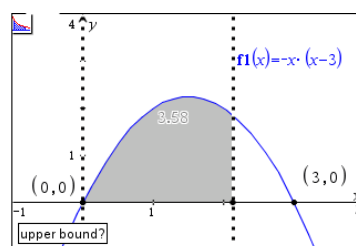
To find the intersection you need to give the lower and upper bounds of the region that includes the intersection.

The GDC shows a line and asks you to set the lower bound.



Do not use the line to set the lower bound as you need to enter an exact value.

Type 0 and press **enter**.



Type 3, the upper bound, and press **enter**.

The GDC shows the area defined by the integral and its value.

$$A = \int_0^3 -x(x-3) dx = 4.5$$

