Chapter 11 / **Example 3**

Area between a curve and the *x*-axis

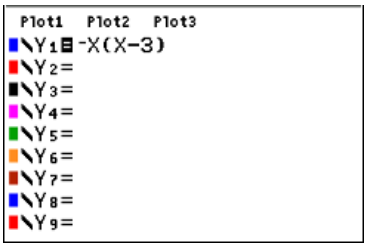
Consider the area *A* of the region enclosed between the curve $y = -x(x-3)$ and the *x*-axis.

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

b Find *A*.

Press [F1] [Y=] to display the equation entry screen.

Type - $x(x - 3)$ and press [ENTER] to enter the equation as Y_1.

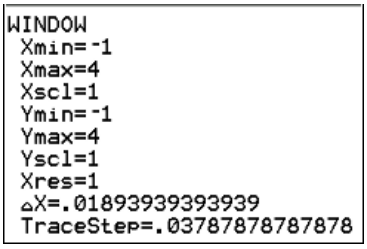


Press [F2] [WINDOW]

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

You can leave the other items as they are.

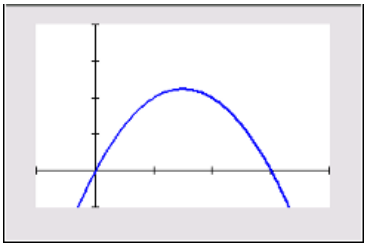
Press [F5] [GRAPH] when you have finished.



Press [F5] [GRAPH] to display the graph screen

The GDC now displays the quadratic function:

$Y_1 = -x(x - 3)$

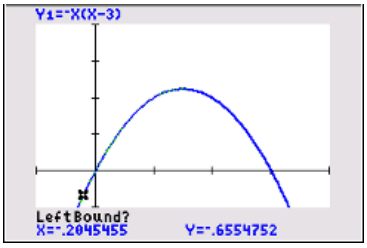


To find the zeros press [2nd] [F4] [CALC] 2:zero

You will need to give the left and right bounds of the region that includes the zero.

The GDC shows a point on the curve and asks you to set the left bound. Move the point using ~ | and choose a position to the left of the zero.

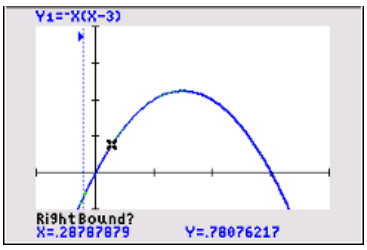
Press [ENTER].



The GDC shows a line where you have set the left bound and a point on the curve.

Move the point using ~ | and choose a position to the right of the zero.

When the region contains the zero, Press [ENTER].



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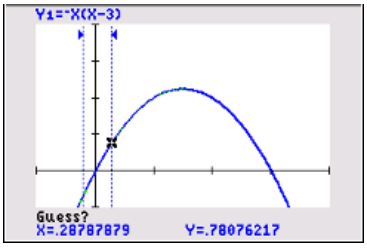
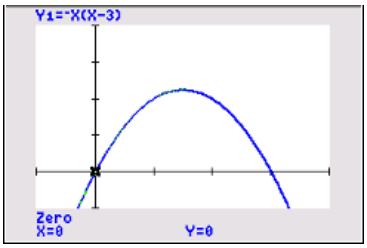
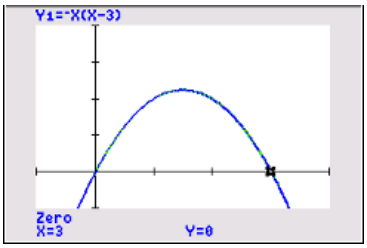
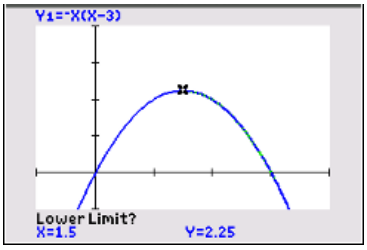
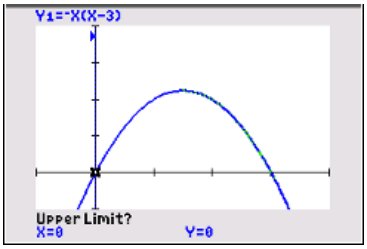
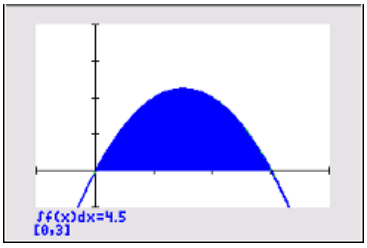
The GDC requires an initial guess for the position of the zero. Choose the default position. Press [ENTER].	
The GDC displays a zero at $(0, 0)$.	
Repeat for the second zero. The GDC displays a zero at $(3, 0)$.	
The area $A = \int_0^3 -x(x-3)\,dx$ To find the integral press [2nd] [F4] [CALC] 7:∫f(x)dx To find the area you need to give the lower and upper limits of the region. The GDC asks you to set the lower limit.	
Type 0 and press [ENTER]. The GDC asks you to set the upper limit.	
Type 3, the upper limit, and press [ENTER]. The GDC shows the area defined by the integral and its value. $A = \int_0^3 -x(x-3)\,dx = 4.5$	

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