

Chapter 11 / Example 4

Finding a limit with a GDC

The region bounded by the graph of $f(x) = x^2 + 3$, the x-axis and the vertical lines $x = -1$ and $x = a$ with $a > -1$ has area equal to 12.
Find the value of a .

The definite integral is $\int_{-1}^a x^2 + 3 \, dx$

Open a new document and add a Graphs page.

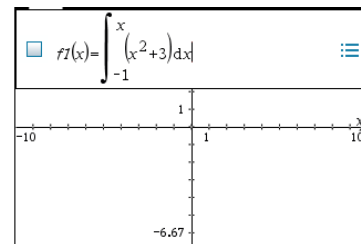
The entry line is displayed at the top of the work area.

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

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

Press $\left[\frac{\square}{\square}\right]$ and select $\left[\int \square dx\right]$ with the trackpad.

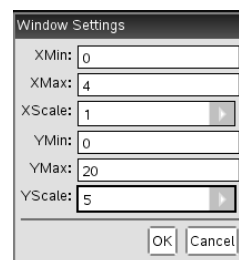
Enter the lower limit -1 and using the upper limit x , the function $x^2 + 3$, the variable x and press $\left[\text{enter}\right]$.



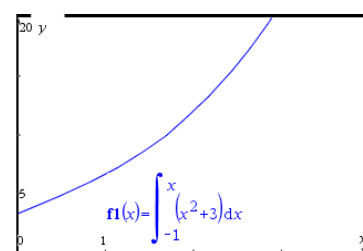
Press $\left[\text{menu}\right]$ 4:Window/Zoom | 1:Window Settings...

Set the axes to show $0 \leq x \leq 4$ with a scale of 1 and $0 \leq y \leq 20$ with a scale of 5

Press $\left[\text{enter}\right]$ when you have finished.



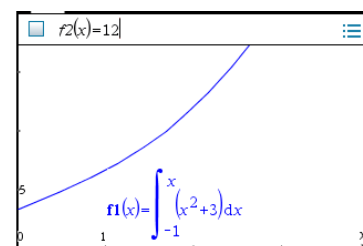
The GDC now displays the function $f1 \, x = \int_{-1}^x x^2 + 3 \, dx$



To find the value of x for which the integral is equal to 12 draw the line $y = 12$ and find the point of intersection.

Press $\left[\text{tab}\right]$ to display the entry line 'f2(x)= ' is displayed.

Type 12 and press $\left[\text{enter}\right]$.



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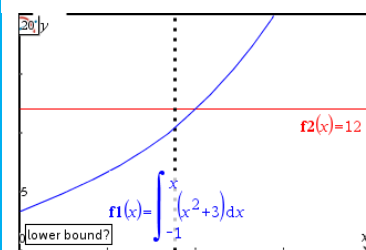
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Press **menu** 6:Analyse Graph | 4:Intersection

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. Move the line using the touchpad and choose a position to the left of the intersection.

Click the touchpad.

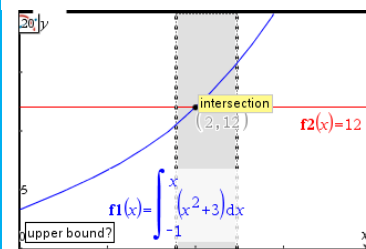


The GDC shows another line and asks you to set the upper bound.

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

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

Click the touchpad.



The GDC displays the intersection of the two straight lines at the point 2,12

$$a = 2$$

