Chapter 7 / **Example 8**

Finding areas with integration

This example is to be done *without* using a GDC. Here you learn to find the definite integrals by using one.

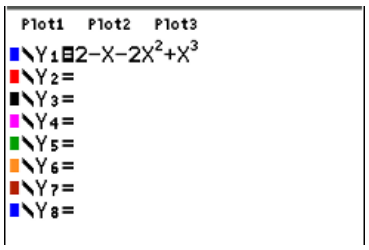
a Factorize the expression $2-x-2x^2+x^3$.

b Hence sketch the graph $f(x)=2-x-2x^2+x^3$.

c Find the area of the region bounded by the graph $f(x)=2-x-2x^2+x^3$ and the x-axis.

Press [f1] [y=] to display the equation entry screen.

Type $2-x-2x^2+x^3$ and press [enter] to enter the equation as Y_1.



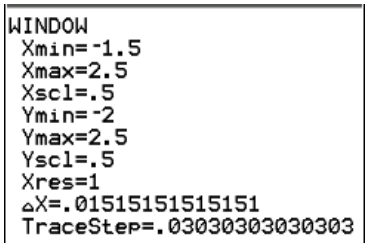
Choose suitable window settings to display the graph.

Press [f2] [window][format]

Set the axes to show $-1.5 \le x \le 2.5$ and $-2 \le y \le 2.5$ with scales of 0.5.

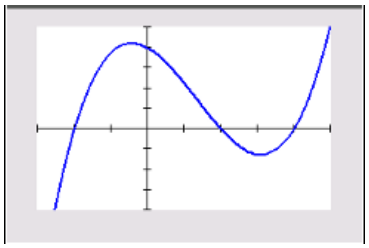
You can leave the other items as they are.

Press [f5] [graph] when you have finished.



The GDC displays the curve $Y_1 = 2-x-2x^2+x^3$ in a suitable window.

Clearly, the zeros are at $(-1,0)$, $(1,0)$ and $(2,0)$.

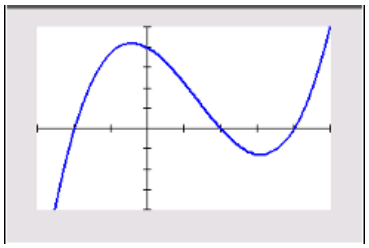


Integrate the section of the curve between $x=-1$ and $x=1$ to find the area bounded by the curve and the x-axis.

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 that includes the intersection.

The GDC asks you to set the lower limit.

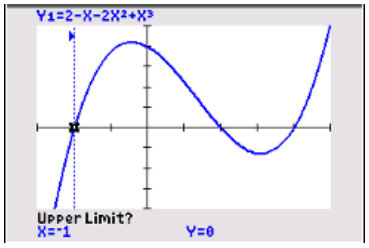


Chapter 7 / **Example 8**

Finding areas with integration

Type -1 and press enter.

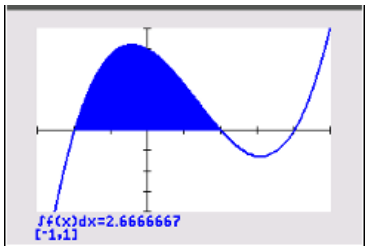
The GDC asks you to set the upper limit.



Type 1, the upper limit, and press enter.

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

$\int_{-1}^{1}\left(2-x-2x^2+x^3\right)\mathrm{d}x=2.667$.

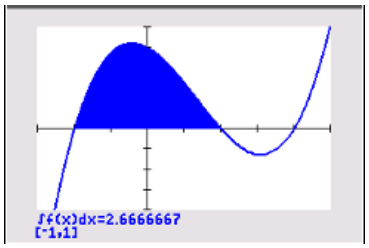


Integrate the section of the curve between $x=1$ and $x=2$ to find the area bounded by the curve and the x-axis.

To find the integral press 2nd [f4] [calc] 7:∫f(x)dx.

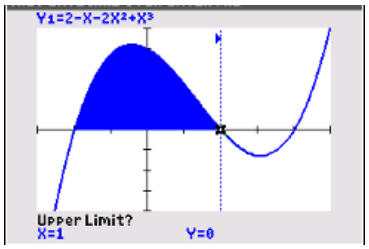
To find the area you need to give the lower and upper limits of the region that includes the intersection.

The GDC asks you to set the lower limit.



Type 1 and press enter.

The GDC asks you to set the upper limit.



Type 2, the upper limit, and press enter.

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

$\int_{1}^{2}\left(2-x-2x^2+x^3\right)\mathrm{d}x=-0.417$.

Adding the absolute values of the two areas:

$2.667+0.417=3.08$