

Chapter 6 / Example 1

Sketching a graph

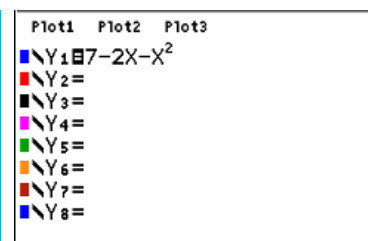
When you “**sketch**” a graph, your sketch should:

- show the general shape of the graph accurately
- label the coordinates of any axes intercepts
- label the coordinates of any vertices.

- a** Sketch the graph of the function $f(x) = 7 - 2x - x^2$, for $-5 \leq x \leq 3$, and hence determine the range.
- b** What would the range be if the domain were unrestricted?

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

Type $7 - 2x - x^2$ and press $[ENTER]$ to enter the equation as Y_1 .

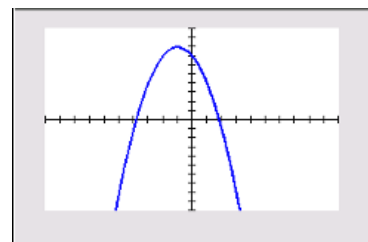


Press $[F5]$ $[GRAPH]$ to display the graph screen

The GDC now displays the quadratic function:

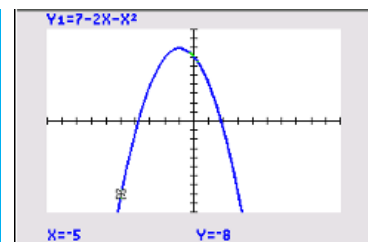
$$Y_1 = 7 - 2x - x^2$$

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



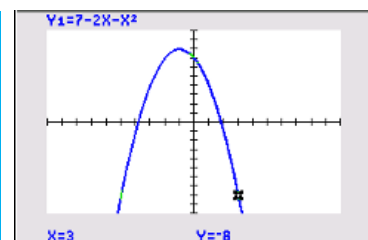
To find the endpoints in the given domain, press $[TRACE]$, type -5 and press $[ENTER]$.

There is an endpoint at $(-5, -8)$



Type 3 and press $[ENTER]$.

There is an endpoint at $(3, -8)$.

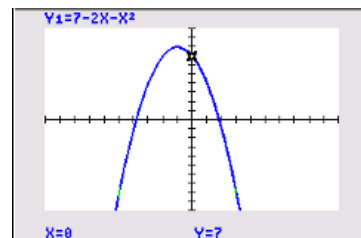


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To find the y -intercept, type 0 and press **ENTER**.

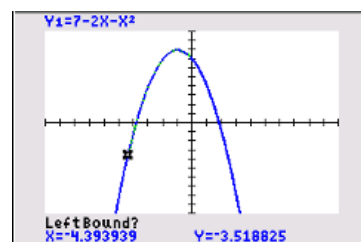
The y -intercept is at $(0,7)$.



To find the x -intercepts or zeros press **2nd** **[F4]** **[CALC]** 2:zero

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

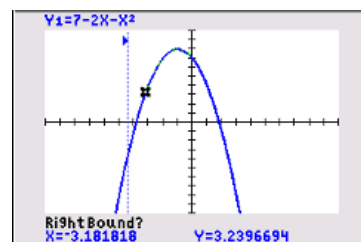
The GDC shows a point on the curve and asks you to set the left bound. Move the point using **▶** **◀** and choose a position to the left of the zero. Press **ENTER**.



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

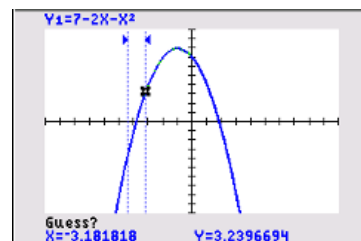
Move the point using **▶** **◀** and choose a position to the right of the zero.

When the region contains the zero, Press **ENTER**.

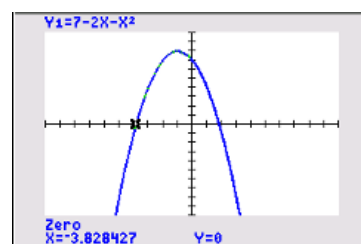


The GDC requires an initial guess for the position of the zero. Choose the default position.

Press **ENTER**.

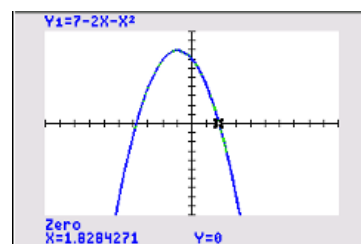


The GDC displays a zero at $(-3.83, 0)$.



Repeat for the second zero.

The GDC displays a zero at $(1.83, 0)$.



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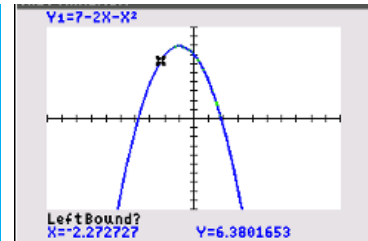
Sketching a graph

To find the vertex press **2nd** **[F4]** **[CALC]** 4:maximum

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

The GDC shows 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 vertex.

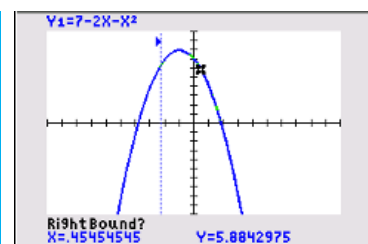
Press **ENTER**.



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

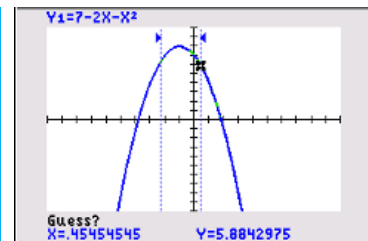
Move the point using **▶** **◀** and choose a position to the right of the vertex.

When the region contains the vertex, Press **ENTER**.



The GDC requires an initial guess for the position of the zero. Choose the default position.

Press **ENTER**.



The GDC displays the vertex.

The vertex of the quadratic function is at $(-1, 8)$.

Take care to interpret what the GDC displays. $X = -1.000002$ is very close to -1 . The small difference is due to the numerical way that the GDC calculates the value.

The range of the function is $-8 \leq y \leq 8$.

With unrestricted domain the range is $y \leq 8$.

