Chapter 5 / **Example 16**

Finding turning points

The GDC can be used to locate turning points as an alternative to using differentiation or to check results.

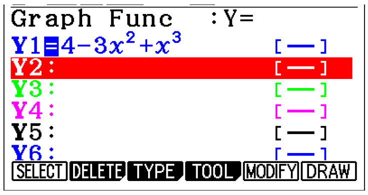
Consider the function $f(x)=4-3x^2+x^3$ for $-2\le x\le 3$.

a Find and classify the nature of any turning points.

b State the intervals *f* which the function is increasing or decreasing.

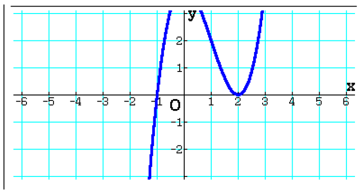
Press MENU 5 GRAPH to display the equation entry screen.

Type $4-3x^2+x^3$ and press EXE to enter the equation as Y1.



Press F6 DRAW to display $\text{Y1}=4-3x^2+x^3$ on the graph screen

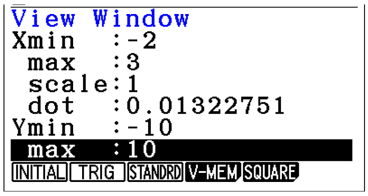
The default axes are $-6.3\le x\le 6.3$ and $-3.1\le y\le 3.1$.



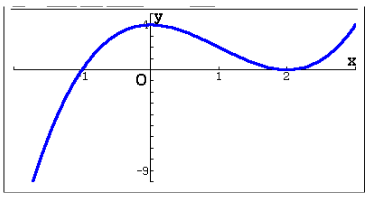
Press F3 V-WIN and set the axes so that $-2\le x\le 3$ and $-10\le y\le 10$ with an x-scale of 1 and y-scale or 5.

Press EXIT when you have finished.

Press F6 DRAW.



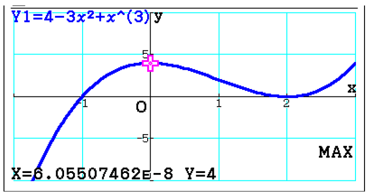
The GDC displays the function $f(x)=4-3x^2+x^3$ for $-2\le x\le 3$.



To find the maximum press F5 G-Solv F2 MAX.

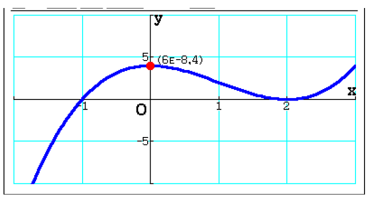
Press EXE to display the coordinates.

Press EXIT to leave G-Solv mode and F6 DRAW to display the graph screen again.



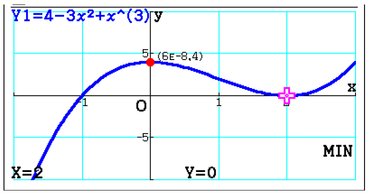
The GDC displays the local maximum point at $(0,4)$.

Take care to interpret what the GDC displays. $6\text{E}-8$ *means* $6\times10^{-8}=0.00000006$ *which is very close to zero. The small difference is due to the numerical way that the GDC calculates the value.*



Chapter 5 / **Example 16**

Finding turning points

To find the minimum press **F5** G-Solv **F3** MIN. Press **EXE** to display the coordinates. Press **EXIT** to leave G-Solv mode and **F6** DRAW to display the graph screen again.	
The GDC displays the minimum at $(2,0)$. From the graph, *f* is increasing for $x \in [-2,0[\cup]2,3]$. *f* is decreasing for $x \in]0,2[$.