

Chapter 4 / **Example 26****Finding extrema graphically**

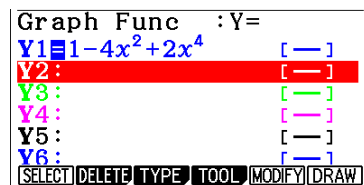
The GDC can be used to confirm the position and nature of turning points.

If  $f(x) = 1 - 4x^2 + 2x^4$ :

- Find any turning points.
- Determine the nature of the points and justify your answers.
- State the intervals in which the function increases/decreases.
- Confirm your answers graphically, and state whether the points found in **a** are local or global extrema.

Press **MENU** 5 **EQN** to display the equation entry screen.

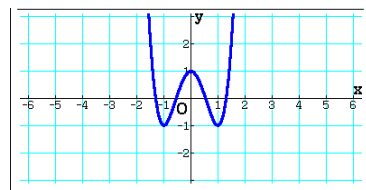
Type  $1 - 4x^2 + 2x^4$  and press **EXE** to enter the equation as Y1.



Press **F6** **DRAW** to display the graph screen

The GDC now displays the function  $Y1 = 1 - 4x^2 + 2x^4$

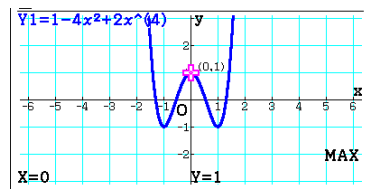
The default axes are  $-6.3 \leq x \leq 6.3$  and  $-3.1 \leq y \leq 3.1$ .



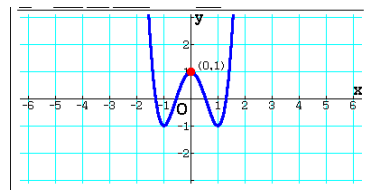
To find the maximum press **F5** **G-Solv** **F2** **MAX**.

Press **EXE** to display the coordinates.

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

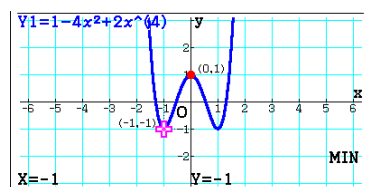


The GDC displays the local maximum point at  $(0, 1)$ .



To find the minima press **F5** **G-Solv** **F3** **MIN**.

Press **EXE** to display the coordinates of the first minimum point.

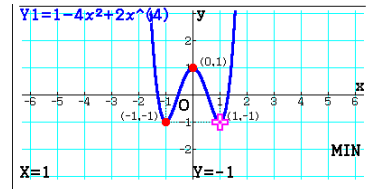


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Press **▶** to move to the second minimum point and press **EXE** to display its coordinates.

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



The GDC displays minima at  $(-1, -1)$  and  $(1, -1)$ .

From the graph,

$f$  is increasing for  $x \in ]-1, 0[ \cup ]1, \infty[$ .

$f$  is decreasing for  $x \in ]-1, 0[ \cup ]1, \infty[$ .

