

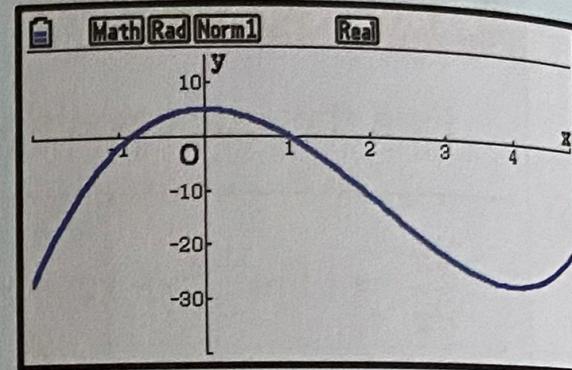
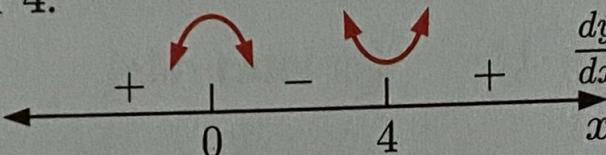
Example 13

Find the greatest and least value of $y = x^3 - 6x^2 + 5$ on the interval $-2 \leq x \leq 5$.

$$\begin{aligned} \text{Now } \frac{dy}{dx} &= 3x^2 - 12x \\ &= 3x(x - 4) \end{aligned}$$

$$\therefore \frac{dy}{dx} = 0 \text{ when } x = 0 \text{ or } 4.$$

The sign diagram of $\frac{dy}{dx}$ is:



\therefore there is a local maximum at $x = 0$, and a local minimum at $x = 4$.

Critical value (x)	y
-2 (end point)	-27
0 (local maximum)	5
4 (local minimum)	-27
5 (end point)	-20

If an interval is given, we must also check the value of the function at the end points.



The greatest of these values is 5 when $x = 0$.

The least of these values is -27 when $x = -2$ and when $x = 4$.