

2.4 USING DERIVATIVES TO FIND ABSOLUTE MAXIMUM AND MINIMUM VALUES

We have already determined how to find relative maximum and minimums. What is an *absolute maximum/minimum*?

The absolute maximum is the largest function value on an interval, and the absolute minimum is the smallest function value on an interval.

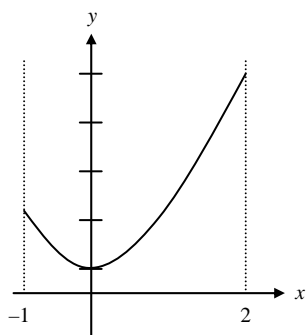
Sometimes, our relative maximum or relative minimum could be the absolute maximum or minimum. Other times, we must check the endpoints.

The Extreme Value Theorem

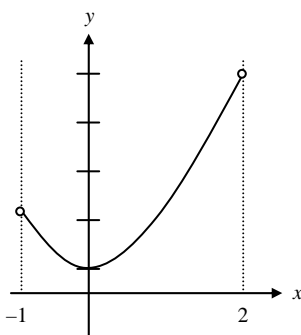
If f is continuous on a closed interval $[a, b]$, then f has both a minimum and a maximum on the interval

Example: Using the graphs provided, find the minimum and maximum values on the given interval. If there is no maximum or minimum value, explain which part of the hypothesis of the Extreme Value Theorem is not satisfied.

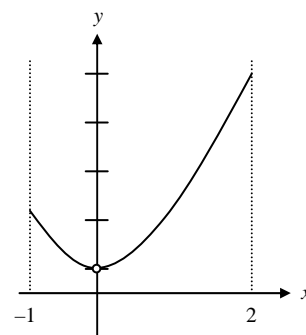
(a) $[-1, 2]$



(b) $(-1, 2)$



(c) $[-1, 2]$



Example: Find all absolute extrema of $f(x) = 3x^4 - 4x^3$ on the interval $[-1, 2]$.

Example: Find all absolute extrema of $g(x) = 2x - 3x^{2/3}$ on the interval $[-1, 3]$.