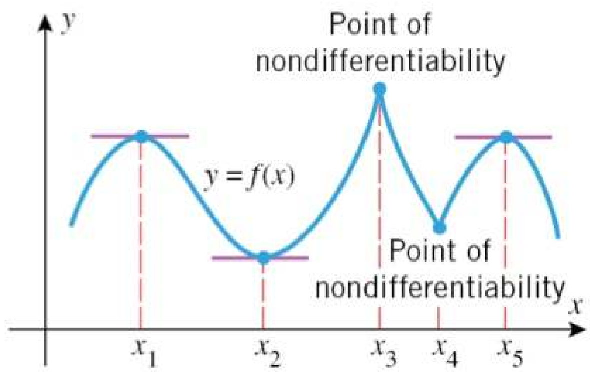
Maxima and Minima

Critical points: Critical points are those points where for all x in the interval either $f'(x) = 0$ or f is not differentiable.

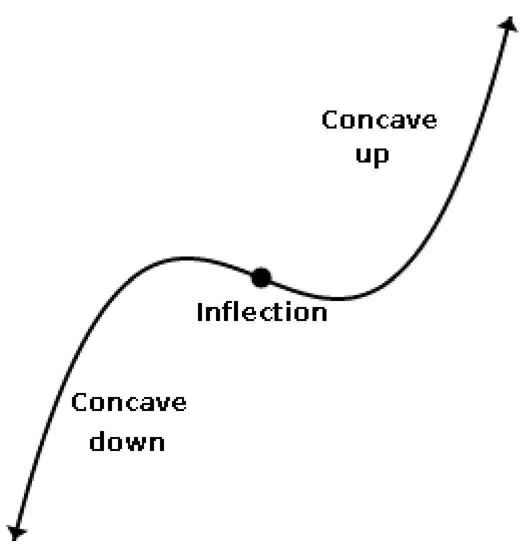


The points x_1, x_2, x_3, x_4, and x_5 are critical points. Of these, x_1, x_2, and x_5 are stationary points (f'(x) = 0) and X_3 and x_4 are points of non-differentiability (f'(x) is undefined or does not exist).

Stationary Points: Stationary points are those points where for all x in the interval $f'(x) = 0$.

Inflection points: Inflection points are those points where for all x in the interval either

$f''(x) = 0$ or $f''(x)$ is undefined.



Concavity: If f is differentiable on an open interval I, then f is said to be **concave up** on I if $f'(x)$ is increasing on I, and f is said to be **concave down** on I if $f'(x)$ is decreasing on I.

Relative Extrema:

A function f is said to have a **relative maximum** at x_0 if there is an open interval containing x_0 on which $f(x_0)$ is the largest value, i. e., $f(x_0) \geq f(x)$ for all x in the interval.

A function f is said to have a **relative minimum** at x_0 if there is an open interval containing x_0 on which $f(x_0)$ is the smallest value, i. e., $f(x_0) \leq f(x)$ for all x in the interval.

If f has either a relative maximum or a relative minimum at x_0, then f is said to have a **relative extremum** at x_0.

RELATIVE MAXIMA AND MINIMA