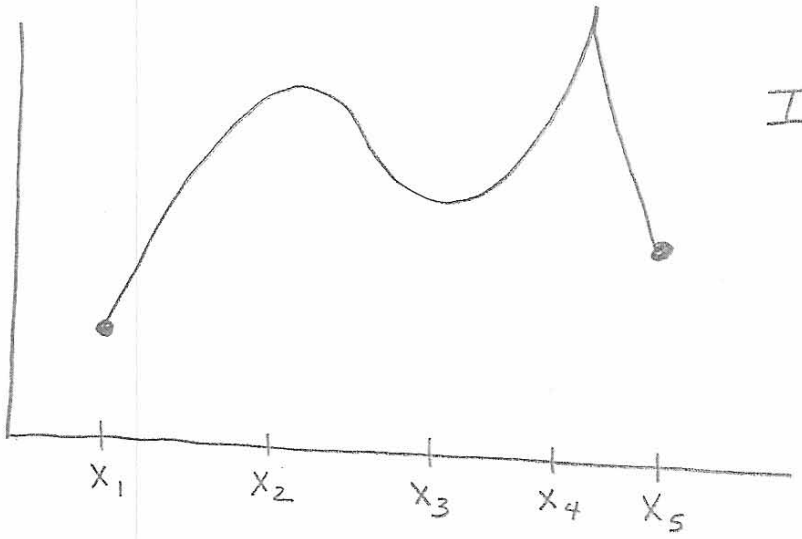
2.4 Extrema

Definition: Let $f(x)$ be defined on interval I containing c. If $f(c)$ is the largest or smallest value for each $f(x)$ where x is in I then $f(c)$ is an <u>absolute extremum for I</u>. Respectively, it is an absolute maximum or absolute minimum.

Definition: If there exists an open interval (a,b) containing c and $f(c)$ is an absolute extremum in (a,b) then $f(c)$ is a <u>relative extremum</u>.



$I = [x_1, x_5]$

$f(x_1)$: absolute min

$f(x_2)$: relative max

$f(x_3)$: relative min

$f(x_4)$: absolute max and relative max

$f(x_5)$: None

Observation: Absolute extrema for $f(x)$ on $[a,b]$ are found at critical values or endpoints.

Example: Find the absolute extrema for $f(x) = 3x^4 - 4x^3 - 27x^2 + 54x - 50$ on $[-3,3]$

Example: Find the absolute extrema for

$g(x) = \sqrt[3]{(2x-3)^2}$ on $[1, 2]$