Maxima and Minima

There is a very slight difference between local maxima/minima and global maxima/minima. But it is very important to note that because this topic fetches various questions in the JEE.

Local Maximum: A function f is said to have a local maximum (also termed as relative maximum) at x=a if $f(x) \leq f(c)$, for every x in some open interval around x=c.

Local Minimum: A function f is said to have a relative minimum or a local minimum around x=c if $f(x) \geq f(c)$, for every x in some open interval around x=a.

Global Maximum: A function f is said to have a global maximum (also termed as absolute maximum) at x=a if $f(x) \leq f(c)$, for every x in the domain under consideration

Global Minimum: A function f is said to have a absolute minimum or a global minimum around x=c if

$f(x) \geq f(c)$, for every x in the whole domain under consideration.

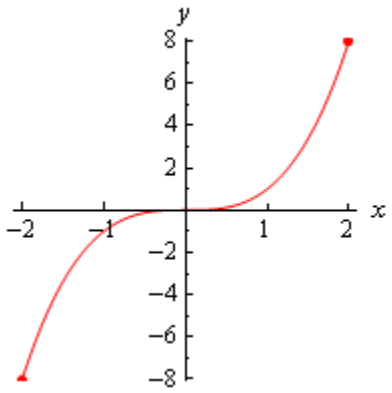
Illustration:

Find the absolute extrema and relative extrema for the following functions.

$f(x) = x^3$ on [-2,2].

Solution:

We first draw the graph of the function so that the picture becomes clear.



Substituting x=2 in the given function we get the function has absolute maximum of eight, while absolute minimum is -8 and occurs at x=-2. It is clear that there is no relative extrema.