

Definition of Concavity:

Let f be differentiable on an open interval I .

The graph of f is concave upward on I if f' is increasing on the interval, and concave downward on I , if f' is decreasing on the interval.

Test for Concavity:

Let f be a function whose second derivative exists on an open interval I .


(1) If $f''(x) > 0$ for all x in I , then the graph of f is concave upward on I .

(2) If $f''(x) < 0$ for all x in I , then the graph of f is concave downward on I .


Concavity

For a differentiable function $f(x)$,

A. If $f''(x) > 0$, the graph of $f(x)$ is concave up

 This means $f'(x)$ is increasing

B. If $f''(x) < 0$, the graph of $f(x)$ is concave down

 This means $f'(x)$ is decreasing