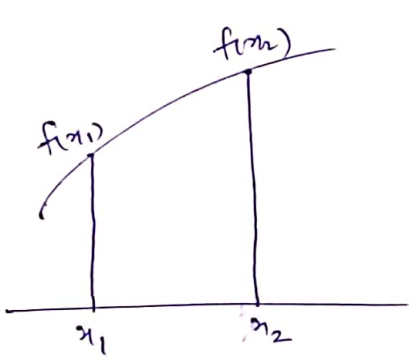
Increasing and Decreasing functions:

Let f be defined on an interval and let x_1 and x_2 denote points in that interval.

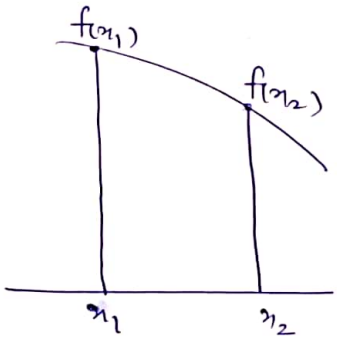
(a) f is increasing on the interval if $f(x_1) < f(x_2)$ when $x_1 < x_2$.

(b) f is decreasing on the interval if $f(x_1) > f(x_2)$ when $x_1 < x_2$.

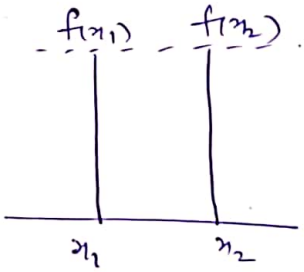
(c) f is constant if $f(x_1) = f(x_2)$ for all points x_1 and x_2.



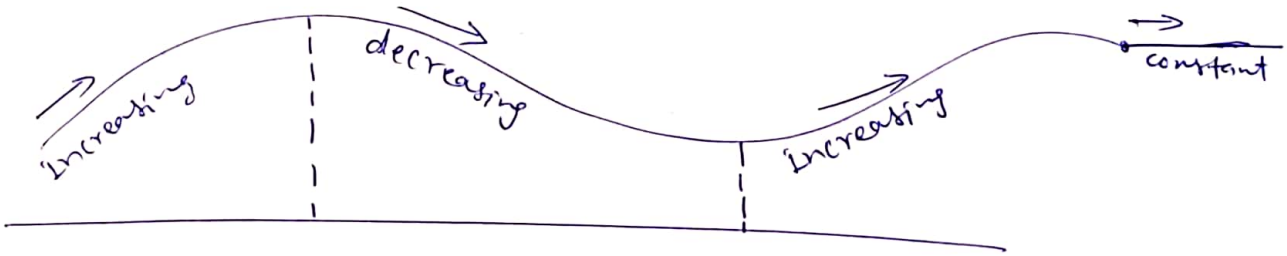
Increasing



Decreasing



Constant



Theorem: Let f be a function that is continuous on a closed interval $[a,b]$ and differentiable on the open interval (a,b).

(a) If $f'(x) > 0$ $\forall\, x \in (a,b)$, then f is increasing on $[a,b]$

(b) If $f'(x) < 0$ $\forall\, x \in (a,b)$, then f is decreasing on $[a,b]$

(c) If $f'(x) = 0$ $\forall\, x \in (a,b)$, then f is constant on $[a,b]$

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