Lecture 09/08/23 Rates of Change

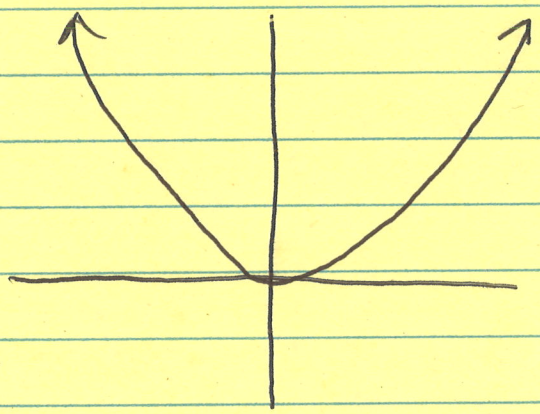
Increasing / Decreasing Functions

Defn: Let $y = f(x)$ $a \le x \le b$.

$f(x)$ is said to be increasing on (a,b) if $f(x)$ increases as x increases on (a,b)

$f(x)$ is said to be decreasing on (a,b) if $f(x)$ decreases as x increases on (a,b).

Ex



$f(x) = x^2$

Where is f decreasing and when is f increasing

Dec: $(-\infty, 0)$

In: $(0, \infty)$

Ex: Is the following function increasing / decreasing or neither?

x	4	3	2	1
y	25	50	75	100

Decreasing

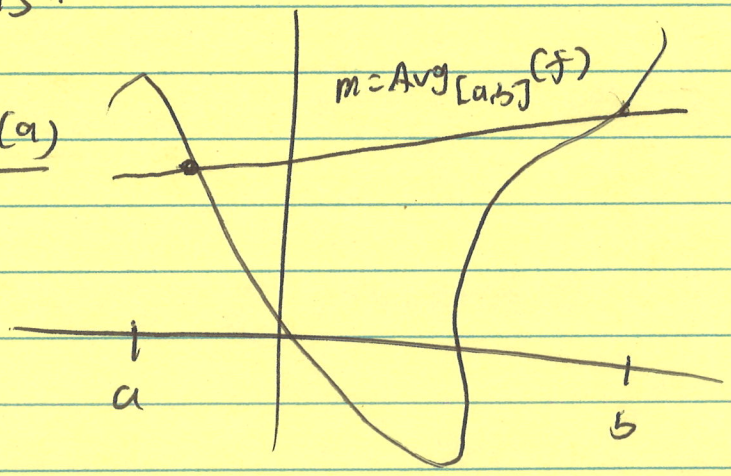
Slope Returns:

$$m = \frac{\Delta y}{\Delta x}$$

We can't talk about slopes of curves (we kinda can in calculus) but we can estimate average rates of change.

Defn: Let $f(x)$ be any function and $[a,b]$ an interval. The average rate of change of $f(x)$ on $[a,b]$ is:

$$\text{Avg}_{[a,b]}(f) = \frac{f(b) - f(a)}{b - a}$$



Ex: Compute the averge rate of change for $g(x) = 2x^3$ on $0 \le x \le 1$

$$\text{Avg}_{[0,1]}(g) = \frac{g(1) - g(0)}{1 - 0} = \boxed{2}$$

Ex: #11 on page 62

(0, 0)

(50, 1600000)

$$\frac{1{,}600{,}000 - 0}{50 - 0} = 32000 \ \$$$

32000 $/year

He saved on average 32000 $ per year.