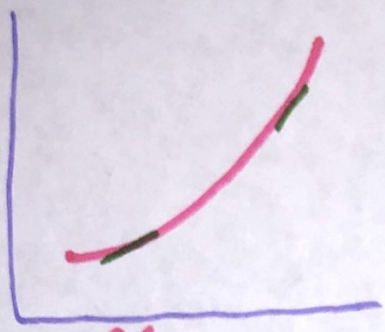
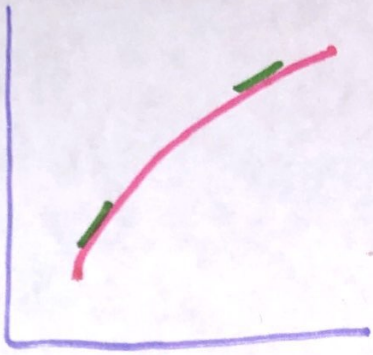
§ 4.3 - 2nd Derivatives + Graphs

A first derivative tells us if a graph is increasing or decreasing, but NOT everything.



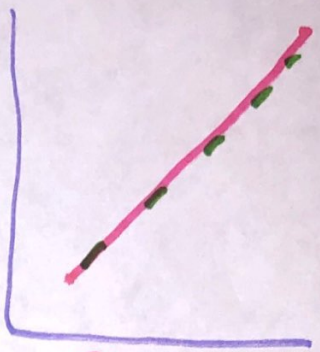
$f' > 0$

$f'' > 0$



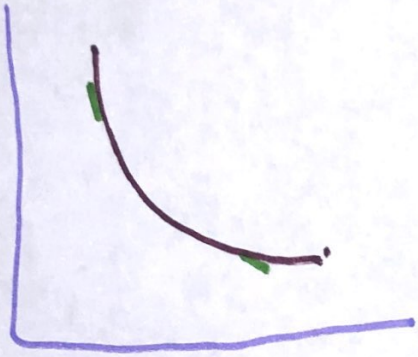
$f' > 0$

$f'' < 0$



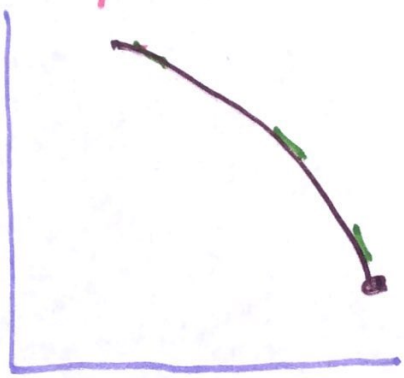
$f' > 0$

$f'' = 0$



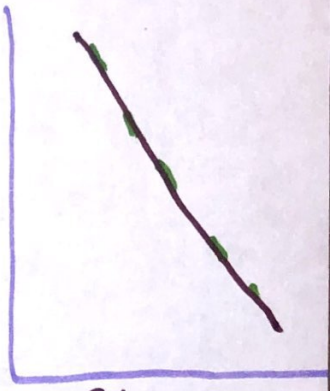
$f' < 0$

$f'' > 0$



$f' < 0$

$f'' < 0$

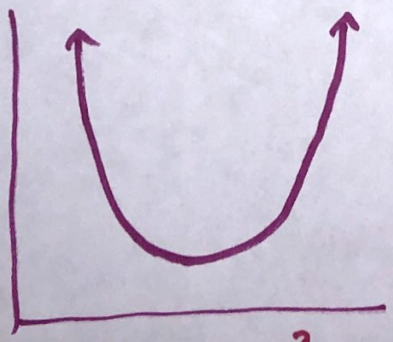


$f' < 0$

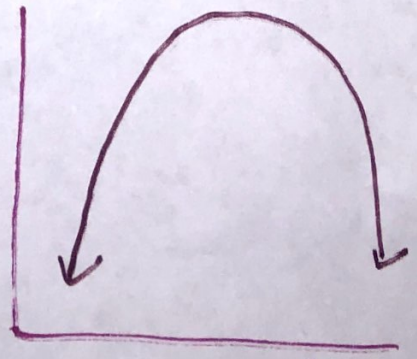
$f'' = 0$

$f''(x) > 0$, Concave up

$f''(x) < 0$ concave down

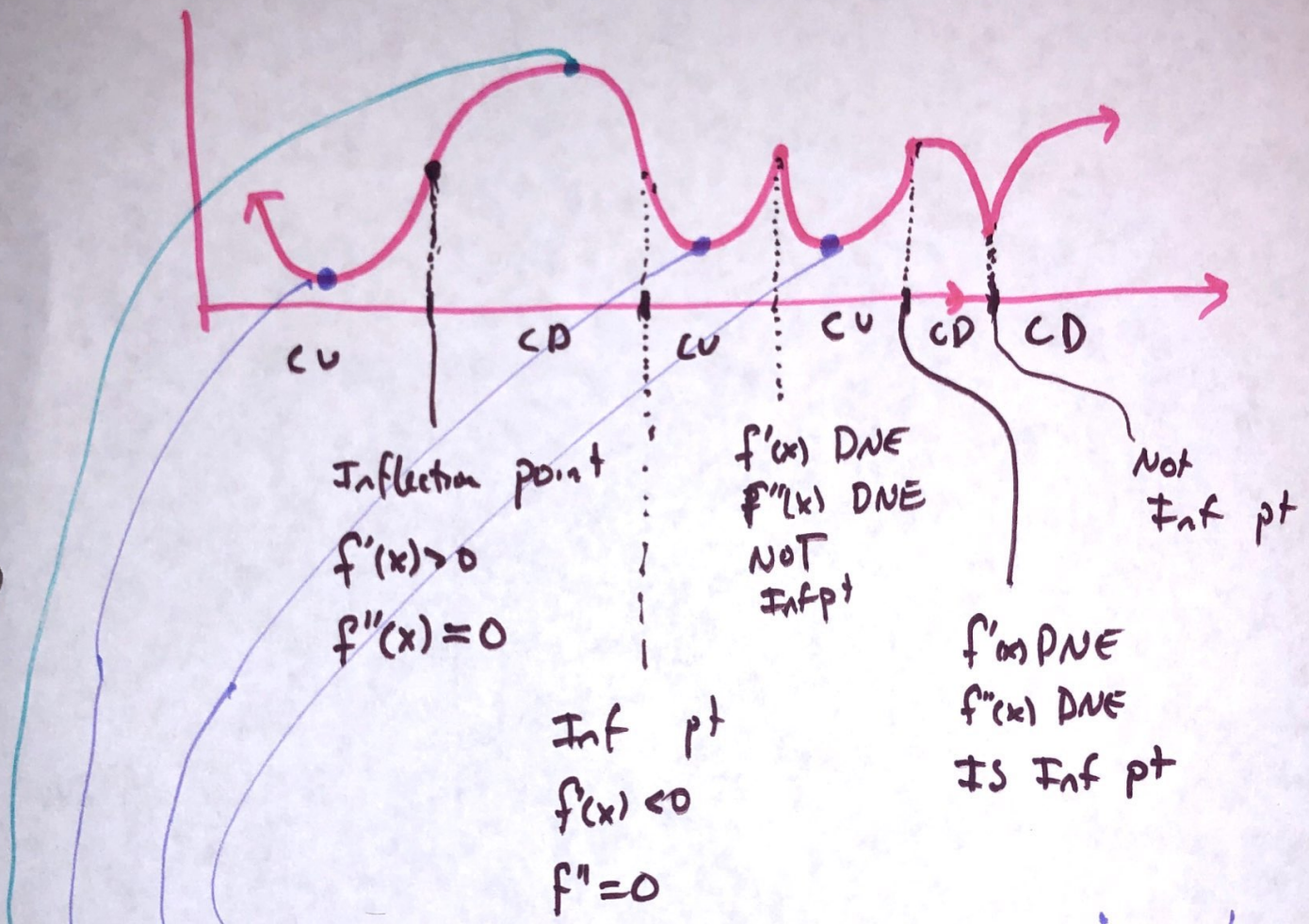


Ex: $y = x^2$



Ex: $y = -x^2$

Defⁿ: An Inflection Point is an x-value where concavity changes, often times when $f''(x) = 0$



Local mins: $f'(x) = 0$, $f''(x) > 0$

Local max: $f'(x) = 0$, $f''(x) < 0$

If $f'(x) = 0$ + $f''(x) = 0$, test Fails

If $f'(x)$ DNE, Test fails

Find CU or CD intervals, just like inc or dec int, with f''