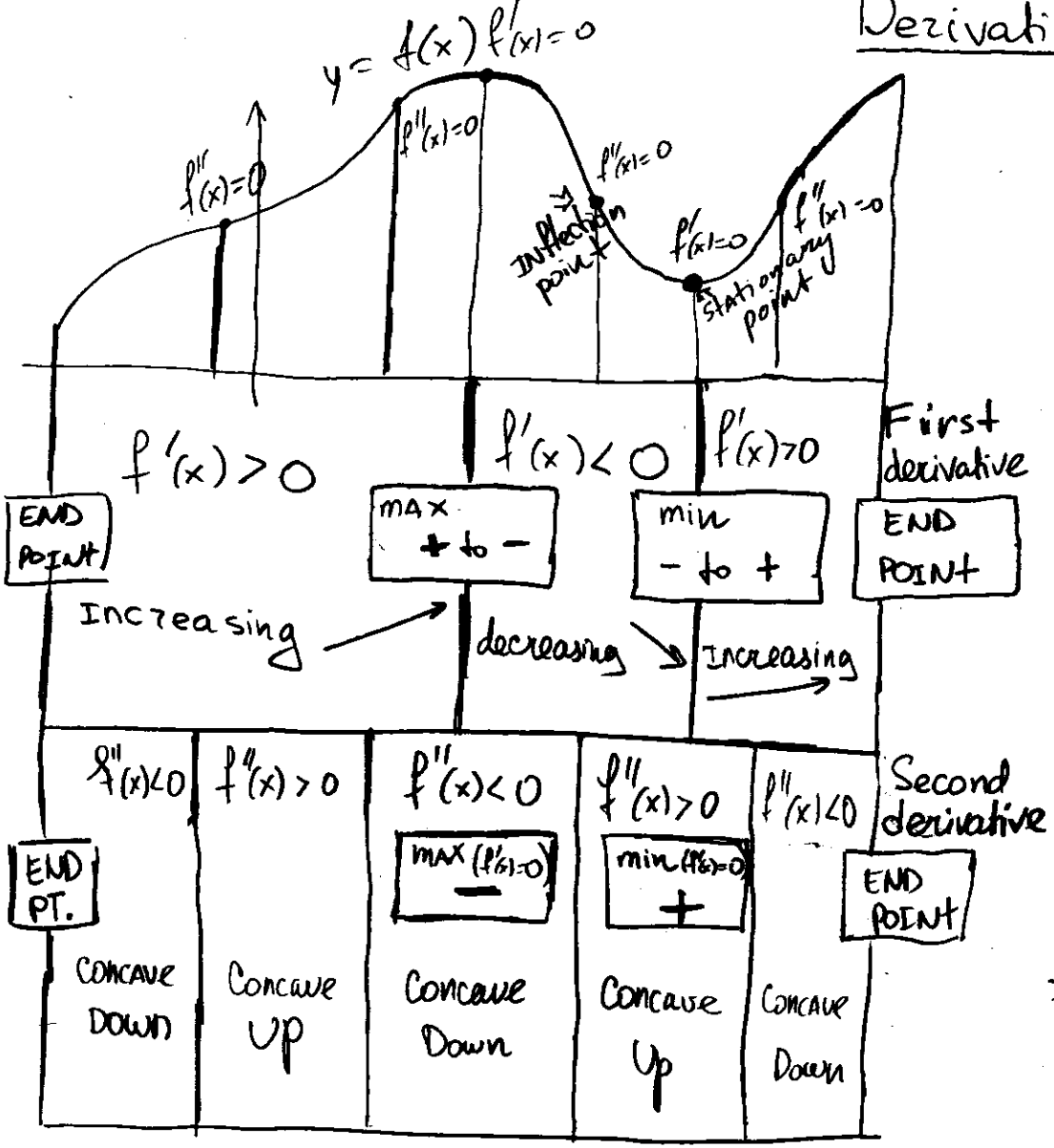
# Derivatives




## Tests:

increasing $\Rightarrow f'(x) \geq 0$ ≀ increasing $\Leftarrow f'(x) > 0$

constant $\Leftrightarrow f'(x) \equiv 0$

decreasing $\Rightarrow f'(x) \leq 0$ ≀ decreasing $\Leftarrow f'(x) < 0$

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MAX $\Leftarrow$ $f'(x^*) = 0$ and $f'(x^*) > 0$ $x < x^*$; $f'(x) < 0$ $x > x^*$

min $\Leftarrow$ $f'(x^*) = 0$ and $f'(x) < 0$ $x < x^*$; $f'(x) > 0$ $x > x^*$

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MAX $\Leftarrow$ $f'(x) = 0$ and $f''(x) < 0$

min $\Leftarrow$ $f'(x) = 0$ and $f''(x) > 0$

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concave up $\Rightarrow f''(x) \geq 0$ ≀ concave up $\Leftarrow f''(x) > 0$

Inflection point $\Leftrightarrow f''(x) = 0$

concave down $\Rightarrow f''(x) \leq 0$ ≀ concave down $\Leftarrow f''(x) < 0$