

$$41. \ f(x) = \sin x + \cos x \quad (0, 2\pi)$$

$$0 = \cos x - \sin x$$

$$\sin x = \cos x$$

$$\frac{\pi}{4}, \frac{5\pi}{4}$$

$$\begin{array}{c} + \\ + \end{array} \quad \begin{array}{c} - \\ - \end{array} \quad \begin{array}{c} + \\ + \end{array}$$

$$f'(0) \quad \frac{\pi}{4} \quad f'(\pi) \quad \frac{5\pi}{4} \quad 2\pi$$

$$\text{Inc: } (0, \frac{\pi}{4}) \cup (\frac{5\pi}{4}, 2\pi)$$

$$\text{Dec: } (\frac{\pi}{4}, \frac{5\pi}{4})$$

$$24. f(x) = (x+2)^2(x-1)$$

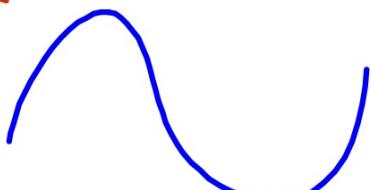
$$(x^2 + 4x + 4)(x-1)$$

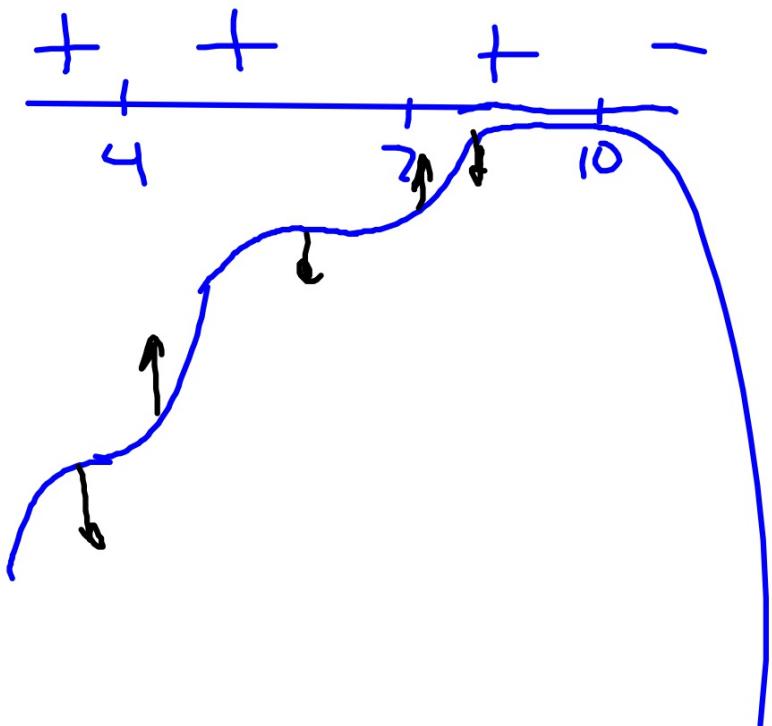
$$\begin{array}{r} x^3 + 4x^2 + 4x \\ -x^2 - 4x - 4 \\ \hline x^3 + 0x^2 - 4x - 4 \end{array}$$

$+ - +$   
 $f'(-3) \quad f'(-1) \quad f'(1)$

$$0 = 3x^2 + 6x \quad x^3 + 3x^2 - 4$$

$$= 3x(x+2)$$





$$\begin{array}{c} + - + \\ \hline 3 \quad 5 \end{array}$$

$$\begin{array}{c} -\infty + \infty \\ \hline 0 \end{array}$$

Inc :  $(-\infty, 3) \cup (5, +\infty)$

Dec :  $(3, 5)$

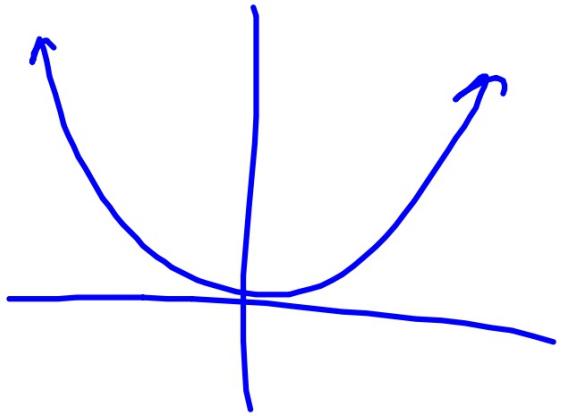
24. X

## 3.4A. Concavity

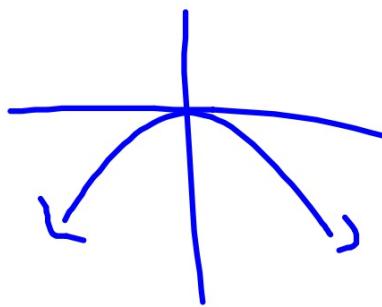
A. Concavity - a description of  
the change <sup>of the</sup> derivative

- Concave "Up"
- Concave "Down"

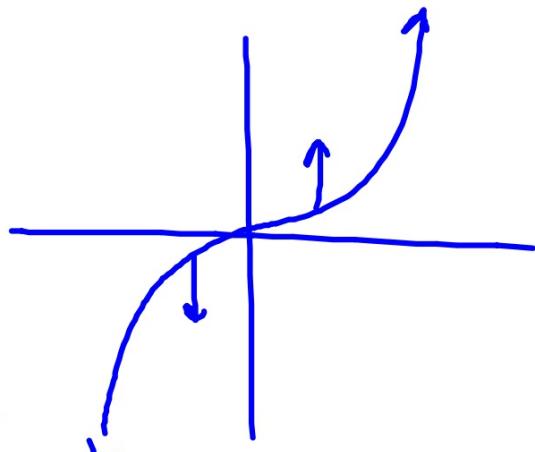
$$\text{Ex. } f(x) = x^2$$



$$f(x) = -x^2$$



$$\text{Ex. } y = x^3$$



$$\begin{aligned} \text{CU: } & (0, +\infty) \\ \text{CD: } & (-\infty, 0) \end{aligned}$$

$$y = 3x^2$$

$$y' = 6x$$

$$0 = 6x$$

$$x = 0$$

$$\begin{array}{c} - \\ \hline f''(-) < 0 \\ + \end{array} f''(0)$$

