Quiz tomorrow:

State where a function is increasing/decreasing. Justify.

State where a function has relative extrema. Justify.

Sketch f' and f'' given f.

5) $y = \frac{1}{4}x^3 - 3x$

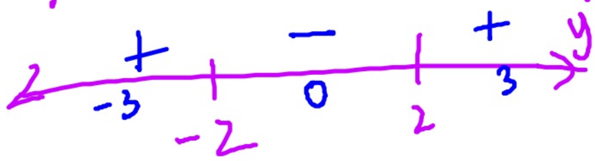
$y' = \frac{3}{4}x^2 - 3$

$0 = \frac{3}{4}x^2 - 3$

$3 = \frac{3}{4}x^2$

$4 = x^2$ $\quad (x+2)^1(x-2)^1 = 0$

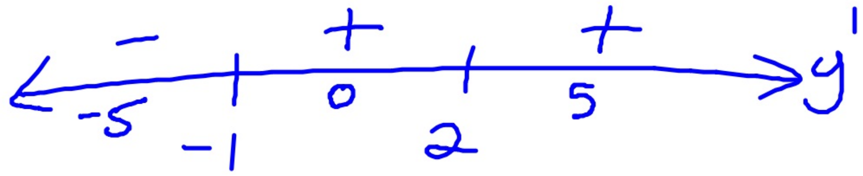
$x = \pm 2$



f is decreasing on (-2,2) because
f' < 0 on this interval.

f is increasing (-inf, -2) U (2, inf) because
f' > 0 on these intervals.

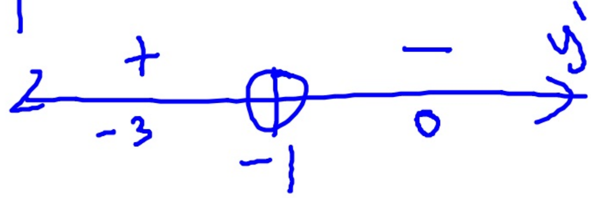
$$y' = (x+1)^1 (x-2)^2$$



7.) $y = (x+1)^{-2}$ $\qquad$ $y = \dfrac{1}{(x+1)^2}$

$$y' = -2(x+1)^{-3} \cdot 1$$

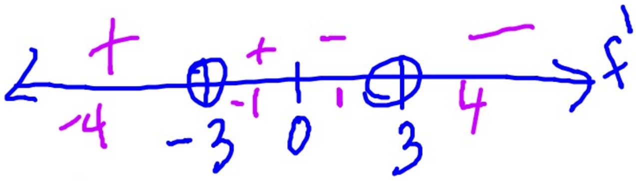
$$y' = \frac{-2}{(x+1)^3}$$



the function is increasing on (-inf, -1) because f' > 0 on this interval.

35) $f(x) = \dfrac{x^2}{x^2-9}$ $\{x \mid x \neq 3, -3\}$

$$f'(x) = \frac{(x^2-9)2x - x^2 \cdot 2x}{(x^2-9)^2}$$



$$f'(x) = \frac{-18x}{(x^2-9)^2}$$

$$x = 0$$

Relative extrema

Relative max at (0,0) because f' changes from positive to negative at this point.

49) $f(x) = \sin^2 x + \sin x \qquad (0, 2\pi)$

$f(x) = (\sin x)^2 + \sin x$

$f'(x) = 2(\sin x)' \cos x + \cos x$

$0 = (\cos x)'(2\sin x + 1)'$

$\cos x = 0$

$x = \frac{\pi}{2}, \frac{3\pi}{2}$

$2\sin x + 1 = 0$

$\sin x = -\frac{1}{2}$

$x = \frac{7\pi}{6}, \frac{11\pi}{6}$

f':

0		$\frac{\pi}{2}$		$\frac{7\pi}{6}$		$\frac{3\pi}{2}$		$\frac{11\pi}{6}$		2π
	$+$		$-$		$+$		$-$		$+$	
		max	π	min		max		min		

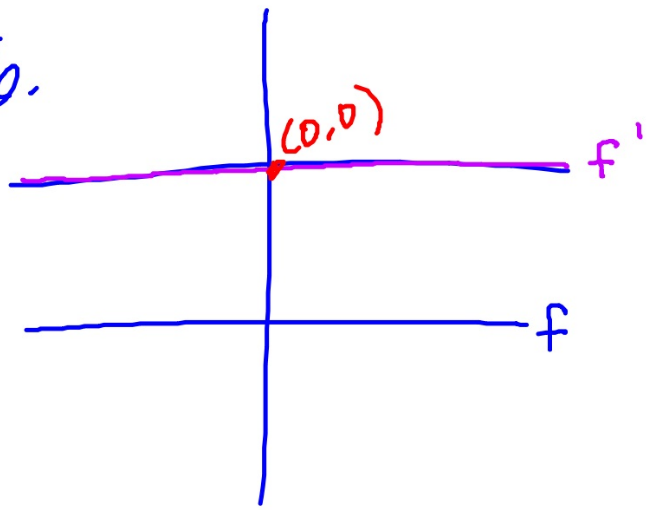
rel. max $\left(\frac{\pi}{2}, 2\right)$

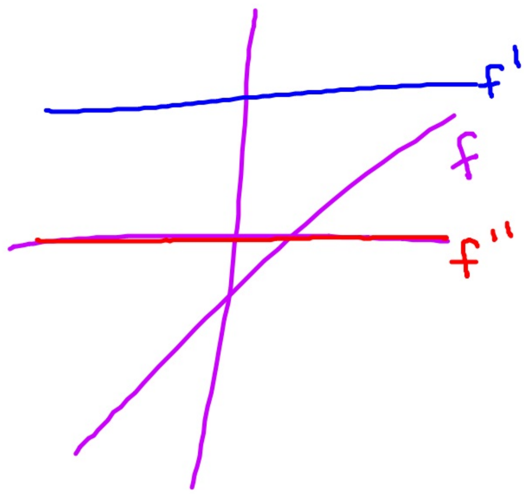
$\left(\frac{3\pi}{2}, 0\right)$

rel. min $\left(\frac{7\pi}{6}, -\frac{1}{4}\right)$

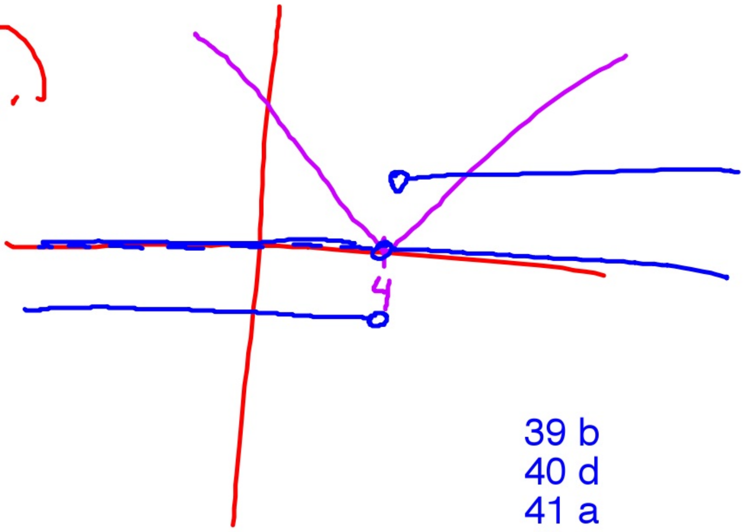
$\left(\frac{11\pi}{6}, -\frac{1}{4}\right)$

46.





48.)



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39 b
40 d
41 a
42 c

(62.)