

Sec 3.3 #24. $f(x) = (x+2)^2(x-1)$

critical numbers: $f'(x) = 0$ or $f'(x)$ d.n.e.

$$f'(x) = 2(x+2)(x-1) + (x+2)^2 = (x+2)(2x-2+x+2) = 3x(x+2)$$

$$f'(x) = 0 \Rightarrow x = 0 \text{ and } x = -2. \quad f'(x) \text{ exists for all } x$$

sign chart

	$-\infty$	-2	0	∞
$f'(x)$		+	-	+
$f(x)$	inc		dec	inc

local max at $x = -2$

local min at $x = 0$

increasing on $(-\infty, -2) \cup (0, \infty)$

decreasing on $(-2, 0)$

#28.

$$f(x) = x^{2/3} - 4 \Rightarrow f'(x) = \frac{2}{3}x^{-1/3} = \frac{2}{3x^{1/3}}$$

$f'(x)$ is never zero. It is undefined when $x = 0$. So one critical number

	$-\infty$	0	∞
$f'(x)$		-	+
$f(x)$	dec.		inc.

f is decreasing on $(-\infty, 0)$

increasing on $(0, \infty)$

local min at $x = 0$.

#44.

$$f(x) = \sqrt{3} \sin x + \cos x \text{ on } (0, 2\pi)$$

$$f'(x) = \sqrt{3} \cos x - \sin x \rightarrow \text{defined on } (0, 2\pi)$$

$$f'(x) = 0 \Rightarrow \sqrt{3} \cos x = \sin x \Rightarrow \tan x = \sqrt{3} \Rightarrow x = \frac{\pi}{3} \text{ or } \frac{4\pi}{3}$$

	0	$\pi/3$	$4\pi/3$	2π
$f'(x)$		+	-	+
$f(x)$	inc.		dec.	inc.

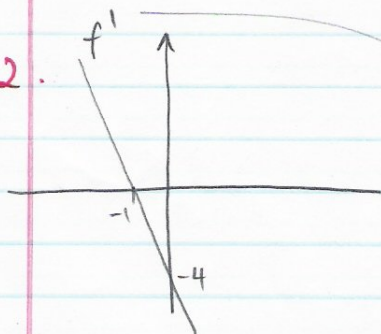
local max at $x = \frac{\pi}{3}$

local min at $x = \frac{4\pi}{3}$

increasing on $(0, \frac{\pi}{3}) \cup (\frac{4\pi}{3}, 2\pi)$

decreasing on $(\frac{\pi}{3}, \frac{4\pi}{3})$

#62.



sign chart for f' :

	$-\infty$	-1	∞
f'		+	-
f	inc.		dec.

f is increasing on $(-\infty, -1)$
decreasing on $(-1, \infty)$

local max at $x = -1$