MATH 149 Homework 13 SOLUTIONS

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

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

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

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

sign chart

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

f is decreasing on $(-\infty,0)$
increasing on $(0,\infty)$
local max at $x=0$.

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

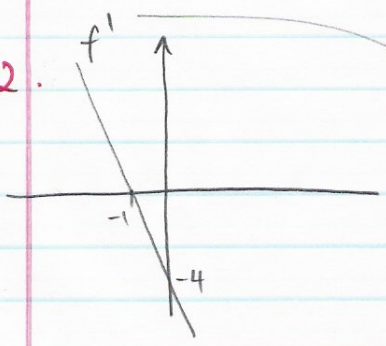
$f'(x) = \sqrt{3}\cos x - \sin x$ → defined on $(0,2\pi)$.

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

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

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

local max at $x=-1$