3.7 Curve Sketching - day 2

Ex. 1 Given $g(x)=\frac{4x}{(3+x^4)}$, $g'(x)=\frac{12(1-x^4)}{(3+x^4)^2}$, $g''(x)=\frac{-48x^3(5-x^4)}{(3+x^4)^3}$,

provide a full analysis and sketch *g(x)*.

$g(x)$	$g'(x)$	$g''(x)$
Zeroes: $x=0$ HA: $y=0$	Zeroes: $x=\pm 1$	Zeroes: $x=0,0,0,\pm\sqrt[4]{5}$ $x\doteq 0,0,0,\pm 1.5$

$g(x)$:

	0	
$-$		$+$

$g'(x)$:

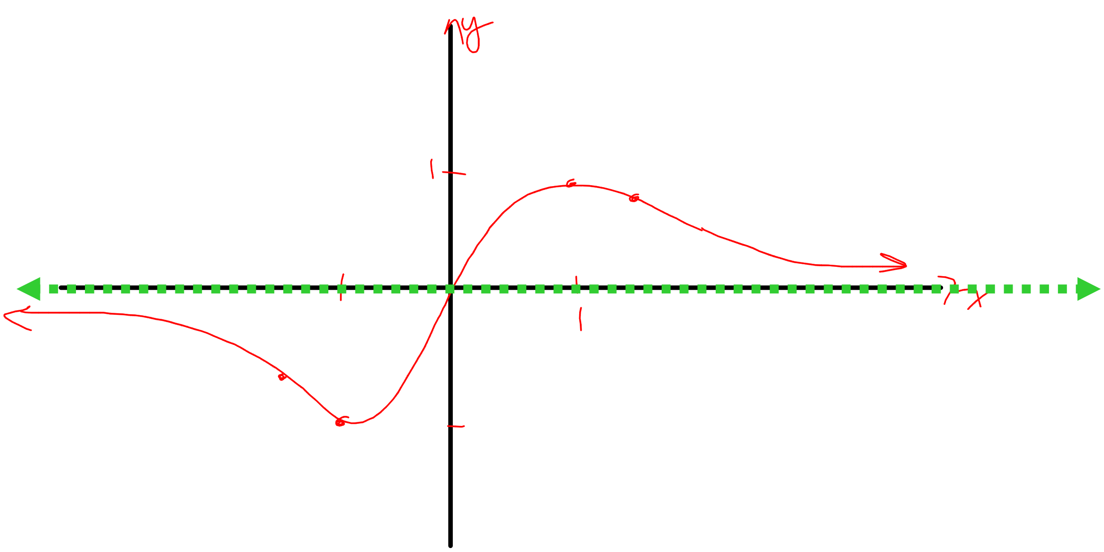
	-1		1	
$-$	MIN	$+$	MAX	$-$

MIN $(-1,-1)$
MAX $(1,1)$

$g''(x)$:

	-1.5		0		1.5	
$-$	POI	$+$	POI	$-$	POI	$+$

POI $(-1.5,-0.75)$
POI $(0,0)$
POI $(1.5,0.75)$



Mar 19-4:50 PM

Ex. 2 Determine the constants a, b, c and d such that the curve defined by $f(x) = ax^3 + bx^2 + cx + d$ has a local maximum at the point (2,4) and a point of inflection at the origin.

$d = 0$ $f(0) = 0$

$f''(0) = 0$

$f(2) = 4$

$f'(2) = 0$

$f'(x) = 3ax^2 + 2bx + c$

$f''(x) = 6ax + 2b$

① Sub in givens ⇒ f''

$0 = 6a(0) + 2b$

$b = 0$

② Sub f(2)=0 & b=0 into f'

$0 = 3a(2)^2 + 2(0)(2) + c$

$0 = 12a + c$

$c = -12a$

③ Sub $f(2) = 4$, $b = 0$, $c = -12a$, $d = 0$ into f(x)

$4 = a(2)^3 + (0)(2)^2 + (-12a)(2) + 0$

$4 = -16a$

$a = -\frac{1}{4}$

④ Sub $a = -\frac{1}{4}$ into $c = -12a$

$c = -12(-\frac{1}{4})$

$= 3$

$\therefore$ $a = -\frac{1}{4}$

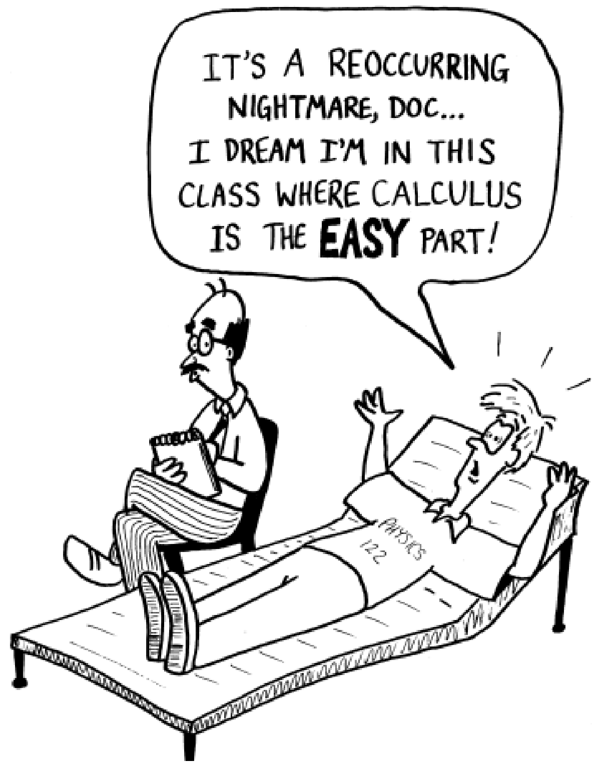
$b = 0$

$c = 3$

$d = 0$

Mar 19-4:54 PM

Homework
Page 213 #7
Page 218 #10,18



Mar 19-5:09 PM