Good afternoon: warm up

Show that $2y^2-x^3=2-3x$ has a vertical tangent when $x=-2$.

$$\frac{d}{dx}\left(2y^2-x^3\right)=\left(2-3x\right)\frac{d}{dx}$$

$$4y\cdot y' - 3x^2 = -3$$

$$4yy' = 3x^2-3$$

$$y' = \frac{3x^2-3}{4y} = \frac{3(-2)^2-3}{4(?)} = \frac{9}{0} \Rightarrow \text{vert tang}$$

$$2y^2-(-2)^3 = 2-3(-2)$$

$$2y^2+8 = \cancel{2+6}\ 8$$

$$2y^2+8=8$$

$$2y^2=0 \longrightarrow y^2=0$$

$$y=\sqrt{0}$$

$$y=0$$

Second warm up:

$$\lim_{\Delta x \to 0} \frac{\ln(3 + \Delta x) - \ln 3}{\Delta x}$$

$$f'(x) = \lim_{\Delta x \to 0} \frac{f'(x+\Delta x) - f(x)}{\Delta x}$$

$f(x) = \ln(x)$

$f'(3)$? $\quad \frac{1}{x} = \frac{1}{3}$

Find the location of the horizontal and vertical tangents of

$y=x\sqrt{4-x^2}$

$f \qquad g: (4-x^2)^{1/2}$

$f': 1 \qquad g': \cancel{\tfrac{1}{2}}(4-x^2)^{-1/2} \cdot \cancel{2}x$

$-x(4-x^2)^{-1/2}$

$f'g + fg'$

$y' = 1 \cdot (4-x^2)^{1/2} + x \cdot -x(4-x^2)^{-1/2}$

$y' = (4-x^2)^{1/2} - x^2(4-x^2)^{-1/2}$

$y' = (4-x^2)^{-1/2}\left[(4-x^2)^1 - x^2\right]$

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

H.T: $x = \pm\sqrt{2}$

V.T: $x = \pm 2$

L'Hôpital's Rule

$$\lim_{x \to 4} \frac{x^2-16}{x-4} = \frac{0}{0}$$ indeterminate

$$\lim_{x \to 4} x+4 = 8$$

$$\lim_{x \to 4} \frac{2x}{1} = 8$$

L'Hôpital's Rule

If $\lim\limits_{x \to c} \dfrac{f(x)}{g(x)}$ gives an indeterminate form

$\left[\frac{0}{0}, 1^{\infty}, 0 \cdot \infty, 0^{0}, \infty - \infty\right]$

then $\lim\limits_{x \to c} \dfrac{f(x)}{g(x)} = \lim\limits_{x \to c} \dfrac{f'(x)}{g'(x)}$

ex/

$$\lim_{x \to 3} \frac{2x^2 - 4}{x}$$

$$\frac{14}{3}$$

ex/

$$\lim_{x \to \infty} \frac{4x^2 - 3x}{8 - 6x^2}$$

$$= \frac{\infty}{\infty}$$

l'hôp

$$\lim_{x \to \infty} \frac{8x - 3}{-12x} = \frac{\infty}{\infty} \text{ l'}$$

l'hôp

$$\lim_{x \to \infty} \frac{8}{-12} = 8/-12$$

$$4/-6$$

What to work on?

- practice assessment
- old hw needed for retakes
- retake something

Assessment is Monday!