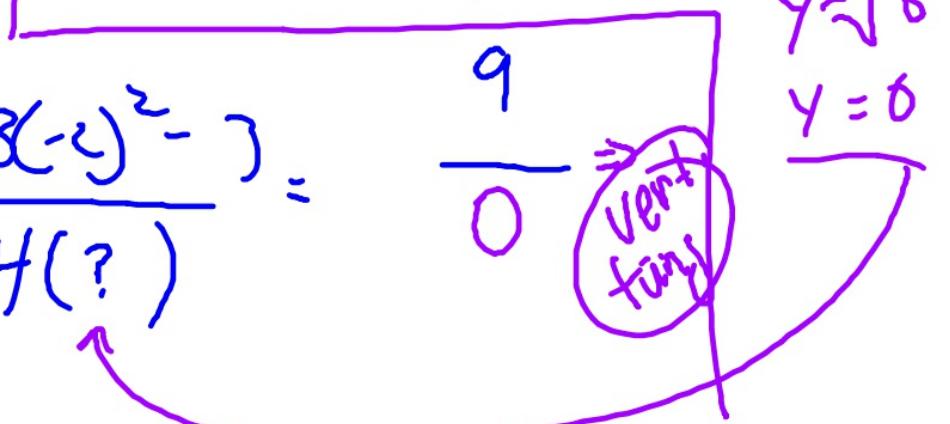


Good afternoon: warm up

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

$$\frac{d}{dx} (2y^2 - x^3) = (2 - 3x) \frac{d}{dx}$$
$$4yy' - 3x^2 = -3$$
$$4yy' = 3x^2 - 3$$
$$y' = \frac{3x^2 - 3}{4y} = \frac{3(-2)^2 - 3}{4(?)}$$
$$2y^2 - (-2)^3 = 2 - 3(-2)$$
$$2y^2 + 8 = 2 + 6$$
$$2y^2 + 8 = 8$$
$$2y^2 = 0 \rightarrow y^2 = 0$$
$$y = \sqrt{0}$$
$$y = 0$$


Second warm up:

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

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

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

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

Find the location of the horizontal and vertical tangents of

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

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

$$f': 1 \quad g': \frac{1}{2}(4-x^2)^{-1/2} \cdot -2x$$
$$\quad \quad \quad -x(4-x^2)^{-1/2}$$

$$f'g + fg'$$

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

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

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

$$y' = \frac{4-2x^2}{\sqrt{4-x^2}} \quad \text{H.T. : } x = \pm \sqrt{2}$$

$$\text{V.T. : } x = \pm 2$$

L'Hôpital's Rule

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

indeterminate

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

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

L'Hopital's Rule

If $\lim_{x \rightarrow c} \frac{f(x)}{g(x)}$ gives an indeterminate form
 $\left[\frac{0}{0}, 1^\infty, 0 \cdot \infty, 0^0, \infty - \infty \right]$

then $\lim_{x \rightarrow c} \frac{f(x)}{g(x)} = \lim_{x \rightarrow c} \frac{f'(x)}{g'(x)}$

$$\cancel{e^x} \lim_{x \rightarrow 3} \frac{2x^2 - 4}{x}$$

$\frac{14}{3}$

$\cancel{e^x} \lim_{x \rightarrow \infty} \frac{4x^2 - 3x}{8 - 6x^2}$

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

1'hop

$\lim_{x \rightarrow \infty} \frac{8x - 3}{-12x} = \frac{\infty}{\infty}$

1'hop

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

$\frac{4}{-6}$

What to work on?

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

Assessment is Monday!