SEMESTER REVIEW 2

Like 16

$$f(x) = 3x^2 - \frac{1}{x} \qquad -x^{-1}$$

Find eq. of tangent line at $x = 2$.

Point: $f(2) = 3(2)^2 - \frac{1}{2} = 11\frac{1}{2} = \frac{23}{2}$

$(2, {}^{23}/_2)$

Slope: $f'(x) = 6x + x^{-2}$

$= 6x + \frac{1}{x^2}$

$m = 6(2) + \frac{1}{4} = \frac{49}{4}$

$y - y_1 = m(x - x_1)$

$y - \frac{23}{2} = \frac{49}{4}(x - 2)$

$y - \cancel{\frac{23}{2}} = \frac{49}{4}x - \frac{49}{2}$

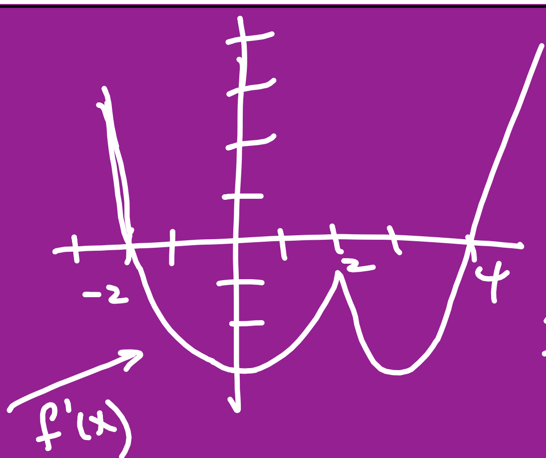
$+{}^{23}/_2$

$$\boxed{y = \frac{49}{4}x - 13}$$

$\lim_{x \to -\infty} f(x) = -3$ Find crit pts.

$\lim_{x \to +\infty} f(x) = 6$

Vertical	Horiz	Slant/Curv.
$\lim_{x \to \#} f(x) = \pm\infty$ ← Denom $= 0$	$\lim_{x \to \pm\infty} f(x)$ Use highest power.	– Higher power in numerator. – Long Division



Crit Pts

$f'(x) = 0$

$x = -2, 4$

Inc/Dec

$+$		$-$		$+$
	-2		4	

above/below x-axis

Rel Max/Min

Concavity - Where f' is inc/dec

$-$		$+$		$-$		$+$
	0		2		3	

Peaks/Valleys

Infl. Pt 0, 2, 3

Mean Value

$$f'(c) = \frac{f(b) - f(a)}{b - a}$$

Solve for c.

Implicit Differentiation

$4x^3y^2 + 3e^y = 2\ln x$ Find $\frac{dy}{dx}$.

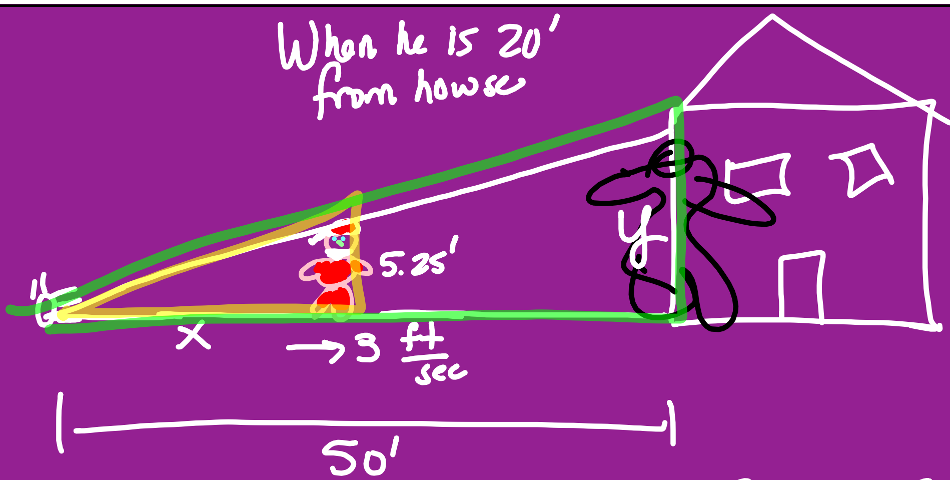
$4x^3 \cdot 2y\frac{dy}{dx} + y^2 \cdot 12x^2 + 3e^y\frac{dy}{dx} = 2 \cdot \frac{1}{x}$

$8x^3y\frac{dy}{dx} + 12x^2y^2 + 3e^y\frac{dy}{dx} = \frac{2}{x}$

$\frac{dy}{dx}(8x^3y + 3e^y) = \frac{2}{x} - \frac{12x^2y^2}{1} \cdot \frac{x}{x}$

$\frac{dy}{dx}(8x^3y + 3e^y) = \frac{\frac{2 - 12x^3y^2}{x}}{} \cdot \frac{1}{8x^3y + 3e^y}$

$= \frac{2 - 12x^3y^2}{8x^4y + 3xe^y}$



$$\frac{x}{5.25} = \frac{50}{y}$$

$$\frac{d}{dt}\left[xy = 262.5\right]$$

$$x \cdot \frac{dy}{dt} + y \cdot \frac{dx}{dt} = 0$$

$$30 \cdot \frac{dy}{dt} + 8.75(3) = 0$$

$$\frac{30}{5.25} = \frac{50}{y}$$

$$30y = 262.5$$

$$y = 8.75$$

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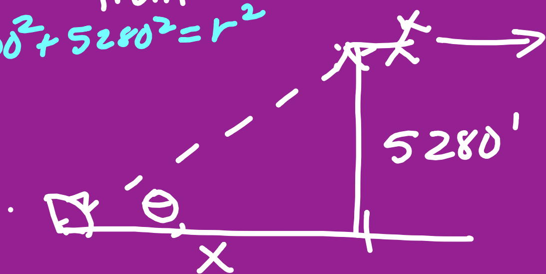
$30° \cdot \frac{\pi}{180} = \frac{\pi}{6}$

When 2500' horizontally from radar

$2500^2 + 5280^2 = r^2$



Radar is rotating at 30°/min

How fast is Vixen's horiz distance from radar changing?

$$\frac{d}{dt}\left[\tan\theta = \frac{5280}{x}\right]$$

$$\sec^2\theta \frac{d\theta}{dt} = -\frac{5280}{x^2}\frac{dx}{dt}$$

$$\left(\frac{5842}{2500}\right)^2\left(\frac{\pi}{6}\right) = \frac{-5280}{2500^2}\frac{dx}{dt}$$

Given $\frac{dV}{dt} = 10 \frac{ft^3}{min}$

$C = 2\pi r$