Homework #7

HW #8

2.8.2 Explicit

$$x^3y - 4\sqrt{x} = x^2y \qquad \text{at } (2, \sqrt{2})$$

$$-4\sqrt{x} = x^2 \cdot y - x^3y$$

$$-4\sqrt{x} = y(x^2 - x^3)$$

$$\Rightarrow \quad y = \frac{-4\sqrt{x}}{x^2 - x^3}$$

$$\Rightarrow y' = \frac{-2x^{-1/2}(x^2 - x^3) - (2x + 3x^2)}{(x^2 - x^3)^2}$$

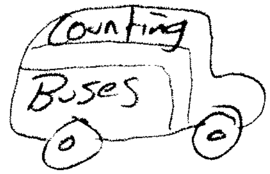
$$y' = \frac{-2(x^2 - x^3) - \sqrt{x}(2x + 3x^2)}{\sqrt{x}(x^2 - x^3)^2}$$

$$y' = \frac{-2x^2(1-x) - x\sqrt{x}(2 + 3x)}{\sqrt{x}(x^2 - x^3)^2}$$

$$\text{at } (2, \sqrt{2}) \text{ Slopes} = \frac{-2 \cdot 2^2(1-2) - 2\sqrt{2}(2 + 3 \cdot 2)}{\sqrt{2}(2^2 - 2^3)^2}$$

$$= \frac{8 - 16\sqrt{2}}{16\sqrt{2}} = \frac{1 - 2\sqrt{2}}{2\sqrt{2}}$$

$$\text{SO : Tangent Line: } y = \frac{1 - 2\sqrt{2}}{2\sqrt{2}}(x - 2) + \sqrt{2}$$



2.8 - 2

slope at $(2, \sqrt{2})$

Implicit

$$\frac{d}{dx}\left(x^3y - 4\sqrt{x}\right) = \frac{d}{dx}\left(x^2y\right)$$

$$\left[x^3\left(1\frac{dy}{dx}\right) + y\left(3x^2\right)\right] - 4\left(\frac{1}{2}x^{-1/2}\right) = \left[x^2\left(1\frac{dy}{dx}\right) + y(2x)\right]$$

$$x^3\frac{dy}{dx} + 3x^2y - 2x^{-1/2} = x^2\frac{dy}{dx} + 2xy$$

$$-3x^2y + 2x^{-1/2} = \qquad -3x^2y + 2x^{-1/2}$$

$$x^3\frac{dy}{dx} = x^2\frac{dy}{dx} + 2xy - 3x^2y + 2x^{-1/2}$$

$$-x^2\frac{dy}{dx} \qquad -x^2\frac{dy}{dx}$$

$$x^3\frac{dy}{dx} - x^2\frac{dy}{dx} = 2xy - 3x^2y + 2x^{-1/2}$$

$$\frac{\frac{dy}{dx}\left(x^3 - x^2\right)}{x^3 - x^2} = \frac{2xy - 3x^2y + 2x^{-1/2}}{x^3 - x^2}$$

$$\frac{dy}{dx} = \frac{2xy - 3x^2y + 2x^{-1/2}}{x^3 - x^2}$$

$$\frac{dy}{dx} = \frac{2(2)(\sqrt{2}) - 3(2)^2(\sqrt{2}) + 2(2)^{-1/2}}{(2)^3 - (2)^2}$$

Compute the slope of the tangent line at the given point both explicitally (first solve for y as a function of x and implicitly)

D★GK

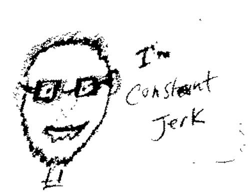
4 $y^2 + 2xy + 4 = 0$ at $(-2, 2)$

$$2y \cdot y' + 2y + 2x \cdot y' = 0$$

$$\quad -2y \qquad\qquad -2y$$

$$\frac{y'\cancel{(2y+2x)}}{\cancel{(2y+2x)}} = \frac{-2y}{(2y+2x)}$$

$$y' = \frac{-2y}{(2y+2x)}$$



DP - Deutsche Produktion

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$\sin(xy) = x^2 - 3$

$\cos(xy) \cdot \left[x\left(\frac{dy}{dx}\right) + y\right] = 2x$ chainrule + Productrule

$x\left[\frac{dy}{dx}\right] + y = \frac{2x}{\cos(xy)}$

$\frac{dy}{dx} = \left[\frac{2x}{\cos(xy)}\right] - y$

x

Double Helix
HW # 7

2.8 find the derivative $y'(x)$ implicitly

#6) $3xy^3 - 4x = 10y^2$

$\frac{d}{dx}(3xy^3) - \frac{d}{dx}(4x) = \frac{d}{dx}(10y^2)$

$\frac{d}{dx}(3x)(y^3) + \frac{d}{dx}(y^3)(3x)$

$3y^3 + (9xy^2)\,y'(x) - 4 = 20u^2$

$3y^3 + (9xy^2)\,y'(x) = 20y^2 \cdot 4$

$(9xy^2)\,y'(x) = 20y^2 - 4 - 3y^3$

$$y'(x) = \frac{20y^2 - 4 - 3y^3}{9xy^2}$$

Investment Banker

2.8 10) $3x + y^3 - \dfrac{4y}{x+2} = 10x^2$

Find the derivative $\dfrac{dy}{dx}$ implicitly.

$$3x(x+2) + y^3(x+2) - 4y = 10x^2(x+2)$$

$$3x^2 + 6x + xy^3 + 2y^3 - 4y = 10x^3 + 20x^2$$

Implicit Diff.

$$6x + 6 + \underbrace{y^3 + 3xy^2\frac{dy}{dx}}_{\text{Product Rule}} + 6y^2\frac{dy}{dx} - 4\frac{dy}{dx} = 30x^2 + 40x$$

$$3xy^2\frac{dy}{dx} + 6y^2\frac{dy}{dx} - 4\frac{dy}{dx} = 30x^2 + 34x - 6 - y^3$$

$$\frac{dy}{dx}\left(3xy^2 + 6y^2 - 4\right) = 30x^2 + 34x - 6 - y^3$$

$$\frac{dy}{dx} = \frac{30x^2 + 34x - 6 - y^3}{3xy^2 + 6y^2 - 4}$$

Patrick Wells

Grayson Rogers

I.T.

$Xe^y - 3y\sin X = 1$

$\left(\frac{dy}{dx}\right) Xe^y - \left(\frac{dy}{dx}\right)(3y) \cdot \sin(x) + \left(\frac{dy}{dx}\right)(\sin) \cdot 3y = \left(\frac{dy}{dx}\right) 1$

$1e^y - (1) \cdot \sin(x) + \cos \cdot 3y = 0$

$e^y - \sin(x) + 3y\cos = 0$

MAT finishers

section 2.9

2

hyperbolic Cosine

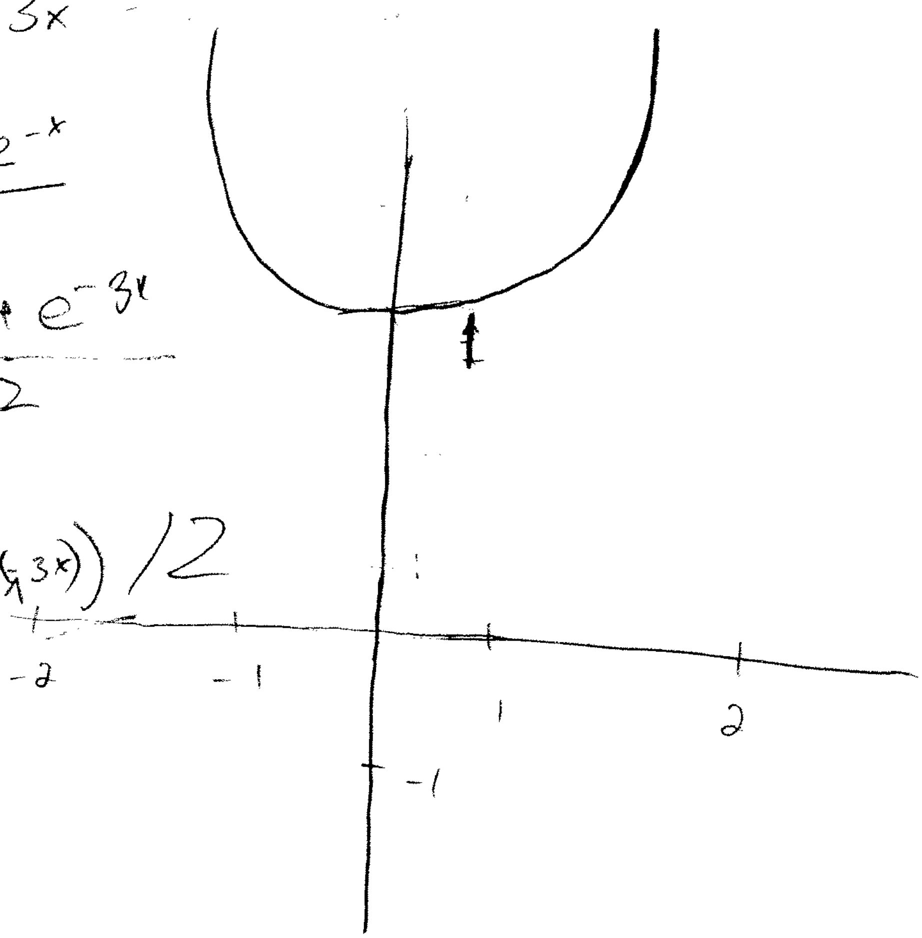
2. $f(x) = \cosh 3x$ $= 3\sinh(3x)$

$\cosh x = \dfrac{e^x + e^{-x}}{2}$

$\cosh 3x = \dfrac{e^{3x} + e^{-3x}}{2}$

Calc

$y_1 = \left(e^{(3x)} + e^{(-3x)}\right)/2$



Mo

PURPLE PARROTS

2.9 # 6

a) $f(x) = \sinh(\sqrt{x})$

$f'(x) = \cosh(\sqrt{x}) \cdot \frac{1}{2}x^{-\frac{1}{2}}$

$f'(x) = \cosh(\sqrt{x}) \cdot \frac{1}{2\sqrt{x}}$

$f'(x) = \frac{\cosh(\sqrt{x})}{2\sqrt{x}}$

b) $f(x) = \sqrt{\sinh(x)}$

$f'(x) = \frac{1}{2}\left(\sinh(x)\right)^{-\frac{1}{2}} \cdot \cosh(x)$

$f'(x) = \frac{1}{2\sqrt{\sinh(x)}} \cdot \cosh(x)$

$f'(x) = \frac{\cosh(x)}{2\sqrt{\sinh(x)}}$

XMAS IN JUL

11. $$\frac{\cancel{4}\left(\sin(4x+7)\right)' - \left(\sin(4x+7)\right)}{x^2} =$$

$$= \frac{x\cos(4x+7)\cdot 4 - \sin(4x+7)}{2}$$

we used quotient rule.

$$= \ln(x)\left(\sin^{-1}(e^{2x})\right)' + \sin^{-1}(e^{2x})(\ln x)'$$

$$= \ln x \frac{1}{\sqrt{1-(e^{2x})^2}}\left(e^{2x}\right)' + \sin^{-1}(e^{2x})\frac{1}{x}$$

$$= \ln \frac{1}{\sqrt{1-e^{2x}}} e^{2x}\cdot 2 + \frac{\sin^{-1}(e^{2x})}{x}$$

Product rule

12 Sample test

Abraham Sherman Feb 23, 201
Timothy Zukowicz BiOS

Evaluate the limits:

$$\#12\ a.\ \lim_{x\to\infty} \frac{9x^{20}-5x+6}{x^{20}-9} = \lim_{x\to\infty} \frac{\frac{0.9x^{20}}{x^{20}} - \frac{5x}{x^{20}} + \frac{6}{x^{20}}}{\frac{x^{20}}{x^{20}} - \frac{0.9}{x^{20}}}$$

$$= \frac{0.9}{1-0} = 0.9$$

$$\lim_{x\to\infty} \frac{-9x^{200}-5x+6}{x^{20}-9} = \lim_{x\to\infty} \frac{-9x^{180} - \frac{5}{x^{19}} + \frac{6}{x^{20}}}{1-\frac{9}{x^{20}}}$$

$$= \lim_{x\to\infty} -9x^{180} = -\infty$$

$$\lim_{x\to\infty} \frac{9x^{20}-5x+6}{x^{200}-9} \quad \lim_{x\to\infty} \frac{9/x^{180} - 5/x^{199} + \frac{6}{x^{200}}}{1 - 9/x^{200}} = 0$$

$$\lim_{x\to\infty} \frac{-0.9x^{21}-5x+6}{x^{20}-9} \rightarrow \lim_{x\to\infty} \frac{-0.9x - \left(\frac{5x}{x^{20}}\right) - \left(\frac{9}{x^{20}}\right)}{1-\left(\frac{9}{x^{20}}\right)} \quad \frac{-0.9x}{1} \quad f(x)\to -\infty$$