April 28 Find $\frac{dy}{dx}$ for the curve below.

(use implicit differentiation)

$$\sin^{-1}(x) + 2y = xy$$

$$\frac{1}{\sqrt{1-x^2}}\,dx + 2dy = 1dx\,y + 1dy\,x$$

$$-1dx\,y \quad -2dy \quad -1dx\,y \quad -2dy$$

$$\frac{1}{\sqrt{1-x^2}}\,dx - 1dx\,y = 1dy\,x - 2dy$$

$$\frac{dx\left(\frac{1}{\sqrt{1-x^2}} - y\right)}{dx} = \frac{dy(x-2)}{dx}$$

$$\frac{\frac{1}{\sqrt{1-x^2}} - y}{x-2} = \frac{\frac{dy}{dx}(x-2)}{x-2}$$

$$\boxed{\frac{dy}{dx} = \frac{\frac{1}{\sqrt{1-x^2}} - y}{x-2}}$$

April 28

Students will verbally explain how to find the derivative of exponential and log functions

(using the words: implicit, inverse, etc...)

$g(x) = 5x^2\tan^{-1}(3x^4)$

find $\frac{d}{dx}(g(x))$

$\frac{d}{dx}(\tan^{-1}(x)) = \frac{1}{1+x^2}$

$$g'(x) = 10x\tan^{-1}(3x^4) + \frac{1}{1+(3x^4)^2}(12x^3)(5x^2)$$

$$g'(x) = 10x\tan^{-1}(3x^4) + \frac{60x^5}{1+9x^8}$$

$f(x) = e^x$

find $f'(x)$

$$\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$$

$$\lim_{h\to 0}\frac{e^{x+h}-e^x}{h}$$

$$= \lim_{h\to 0}\frac{e^x e^h - e^x}{h} = \lim_{h\to 0}\frac{e^x(e^h-1)}{h}$$

$$= e^x \cdot \lim_{h\to 0}\frac{e^h-1}{h}$$

$$= e^x(1) = e^x$$

$\frac{d}{dx}(e^x) = e^x$

$\frac{d}{dx}(a^x) = a^x\ln(a)$

a is any constant

$y = \ln x$

find $\frac{dy}{dx}$

$y = \ln x$

$e^y = e^{\ln x}$

$e^y = x$

$\frac{e^y dy}{dx} = \frac{1dx}{dx}$

$\frac{e^y\left(\frac{dy}{dx}\right)}{e^y} = \frac{1}{e^y}$

$\frac{dy}{dx} = \frac{1}{e^y} = \frac{1}{x}$

$\frac{d}{dx}(\ln x) = \frac{1}{x}$ $\quad$ $\frac{d}{dx}(\log_b x) = \frac{1}{x\cdot\ln(b)}$

$y = e^x + \ln x - x^7$

find y'

$y' = e^x + \frac{1}{x} - 7x^6$

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

find $f'(x)$

$f'(x) = \frac{1}{x}\cdot\sec(x) + \sec(x)\tan(x)\ln(x)$

$= \frac{\sec(x)}{x} + \sec(x)\tan(x)\ln(x)$

$g(x) = \frac{7^x}{x^2+3}$

find $g'(x)$

$g'(x) = \frac{\ln(7)\cdot 7^x(x^2+3) - 2x(7^x)}{(x^2+3)^2}$