Find $\frac{dy}{dx}$ if

$y(x)$

$$\frac{d}{dx}\left(4x^5 - 3y^6\right) = \frac{d}{dx}\left(9 - x - y\right)$$

$$20x^4 - 18y^5 \cdot \frac{dy}{dx} = 0 - 1 - \frac{dy}{dx}$$

$$20x^4 - 18y^5 \frac{dy}{dx} = -1 - \frac{dy}{dx}$$

$$\frac{dy}{dx} - 18y^5 \frac{dy}{dx} = -1 - 20x^4$$

$$\frac{dy}{dx}\left(1 - 18y^5\right) = -1 - 20x^4$$

$$\frac{dy}{dx} = \frac{-1 - 20x^4}{1 - 18y^5} \cdot \frac{-1}{-1} = \frac{20x^4 + 1}{18y^5 - 1}$$

Jun 10-3:12 PM

Find the slope of the tangent line to the curve $xy + y^2 = 6$ at $(1,2)$.

Find $\frac{dy}{dx}$ $\qquad \frac{d(xy+y^2)}{dx}$ $\qquad \frac{d}{dx}(uv) = uv' + vu'$

$$\frac{d}{dx}(xy + y^2) = \frac{d}{dx}(6)$$

$$x\frac{dy}{dx} + y(1) + 2y\frac{dy}{dx} = 0$$

$$x\frac{dy}{dx} + 2y\frac{dy}{dx} = -y$$

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

$$\frac{dy}{dx} = \frac{-y}{x+2y} \; ; \quad m = \left.\frac{dy}{dx}\right|_{(1,2)} = \frac{-2}{1+2(2)}$$

$$= \frac{-2}{5}$$

Jun 5-12:58 PM

Find the slope of the tangent line to the curve $\sin(x^3y)+\cos(2x)=1$ at any point (x,y).

$$\frac{d}{dx}\left[\sin(x^3y)+\cos(2x)\right]=\frac{d}{dx}(1)$$

$$\cos(x^3\cdot y)\cdot\left[x^3\frac{dy}{dx}+y(3x^2)\right]-\sin(2x)\cdot 2=0$$

$$x^3\cos(x^3y)\cdot\frac{dy}{dx}+3x^2y\cos(x^3y)-2\sin(2x)=0$$

$$x^3\cos(x^3y)\frac{dy}{dx}=2\sin(2x)-3x^2y\cos(x^3y)$$

$$\frac{dy}{dx}=\frac{2\sin(2x)-3x^2y\cos(x^3y)}{x^3\cos(x^3y)}$$

Now you try one: find $\frac{dy}{dx}$

$$x^3 + y^3 = y$$

$$3x^2 + \underline{3y^2\frac{dy}{dx}} = \frac{dy}{dx}$$

$$3x^2 = \frac{dy}{dx} - 3y^2\frac{dy}{dx}$$

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

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

Jun 9-12:29 PM