Name: Richard

MATH 200 – QUIZ 8 π

Instructions: Show work and put a box around your final answer.

March 14, 2013

1. This problem concerns the graph of the equation $x^2 + xy - y^2 = 1$.

(a) Use implicit differentiation to find $\frac{dy}{dx}$.

$$\frac{d}{dx}\left[x^2 + xy - y^2\right] = \frac{d}{dx}[1]$$

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

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

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

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

(b) Use your answer from part (a) to find the slope of the tangent line to the graph at the point $(2, 3)$.

$$\left.\frac{dy}{dx}\right|_{(x,y)=(2,3)} = \frac{-2\cdot 2 - 3}{2 - 2\cdot 3} = \frac{-7}{-4} = \boxed{\frac{7}{4}}$$

Name: Richard

MATH 200 – QUIZ 8 π^2

Instructions: Show work and put a box around your final answer.

March 14, 2013

1. This problem concerns the graph of the equation $x^2y^2 = 9$.

(a) Use implicit differentiation to find $\frac{dy}{dx}$.

$$\frac{d}{dx}\left[x^2y^2\right] = \frac{d}{dx}[9]$$

$$2xy^2 + x^2 2y\frac{dy}{dx} = 0$$

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

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

$$\boxed{\frac{dy}{dx} = \frac{-y}{x}}$$

(b) Use your answer from part (a) to find the slope of the tangent line to the graph at the point $(-1, 3)$.

$$\left.\frac{dy}{dx}\right|_{(x,y)=(-1,3)} = \frac{-3}{-1} = \boxed{3}$$

Name: Richard

MATH 200 – QUIZ 8 π^3

Instructions: Show work and put a box around your final answer.

March 14, 2013

1. This problem concerns the graph of the equation $2xy + \pi\sin(y) = 2\pi$.

(a) Use implicit differentiation to find $\frac{dy}{dx}$.

$$\frac{d}{dx}\left[2xy + \pi\sin(y)\right] = \frac{d}{dx}\left[2\pi\right]$$

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

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

$$\frac{dy}{dx}\left(2x + \pi\cos(y)\right) = -2y$$

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

(b) Use your answer from part (a) to find the slope of the tangent line to the graph at the point $(1, \pi/2)$.

$$m = \left.\frac{dy}{dx}\right|_{(x,y)=(1,\pi/2)} = \frac{-2\cdot\pi/2}{2\cdot 1 + \pi\cos(\pi/2)} = \frac{-\pi}{2 + \pi\cdot 0} = \boxed{-\frac{\pi}{2}}$$

Name: Richard

MATH 200 – QUIZ 8 π^4

Instructions: Show work and put a box around your final answer.

March 14, 2013

1. This problem concerns the graph of the equation $y = 2\sin(\pi x - y)$.

(a) Use implicit differentiation to find $\frac{dy}{dx}$.

$$\frac{d}{dx}\left[y\right] = \frac{d}{dx}\left[2\sin(\pi x - y)\right]$$

$$\frac{dy}{dx} = 2\cos(\pi x - y)\cdot\left(\pi - \frac{dy}{dx}\right)$$

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

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

$$\frac{dy}{dx}\left(1 + 2\cos(\pi x - y)\right) = 2\pi\cos(\pi x - y)$$

$$\boxed{\frac{dy}{dx} = \frac{2\pi\cos(\pi x - y)}{1 + 2\cos(\pi x - y)}}$$

(b) Use your answer from part (a) to find the slope of the tangent line to the graph at the point $(1, 0)$.

$$\left.\frac{dy}{dx}\right|_{(1,0)} = \frac{2\pi\cos(\pi\cdot 1 - 0)}{1 + 2\cos(\pi\cdot 1 - 0)} = \frac{2\pi\cos(\pi)}{1 + 2\cos(\pi)} = \frac{2\pi(-1)}{1 + 2(-1)} = \frac{-2\pi}{-1} = \boxed{2\pi}$$