Do Now

Find the derivative at (1,1)

$$3x^2 - 8xy + 12y^2 = 7$$

$u = -8x$
$v = y$

$$6x - 8x\,dy/dx - 8y + 24y\,dy/dx = 0$$

$$6(1) - 8(1)\,dy/dx - 8(1) + 24(1)\,dy/dx = 0$$

$$6 - 8\,dy/dx - 8 + 24\,dy/dx = 0$$

$$dy/dx \frac{(-8 + 24)}{16} = \frac{2}{16} = \frac{1}{8}$$

Dec 2-8:36 AM

Given $(x+2)^2 + (y-3)^2 = 16$

Find all points where there are VTL's and HTL's

$$2(x+2)(1) + 2(y-3)\,dy/dx = 0$$

$$2x + 4 + (2y-6)\,dy/dx = 0$$

$$dy/dx \frac{(2y-6)}{2y-6} = \frac{-2x-4}{2y-6}$$

p+s   p+s

VTL   **HTL**

$2y - 6 = 0$ $-2x - 4 = 0$

$2y = 6$ $-2x = 4$

$y = 3$ $x = -2$

$(x+2)^2 + (y-3)^2 = 16$ $(x+2)^2 + (y-3)^2 = 16$

$(x+2)^2 (3-3)^2 = 16$ $0 + \sqrt{(y-3)^2} = \sqrt{16}$

$\sqrt{(x+2)^2} = \sqrt{16}$ $y - 3 = \pm 4$

$x + 2 = \pm 4$ $y = 3 \pm 4$

$x = -2 \pm 4$ $y = -1, 7$

$x = -6, 2$ $(-2,-1)$ $(-2,7)$

$(-6, 3)$ $(2, 3)$

Dec 2-8:45 AM

Find an equation for the line of tangent to $\frac{x}{x+2y} = y$ in the fourth quadrant when x=1

① Solve for y $(1\frac{1}{2})$ & $(1,-1)$

$\frac{1}{1+2y} = \frac{y}{1}$ $2y^2 + y - 1 = 0$ mult -2

$y(1+2y) = 1$ $(2y^2 + 2y)(y-1) = 0$ add 1

$y + 2y^2 = 1$ $2y(y+1) - (y+1) = 0$ $2y - 1$

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

$y = \frac{1}{2}$ $y = -1$

$$y = \frac{x}{x+2y}$$

$(1, -1)$

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

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

$$dy/dx = \frac{-1 - 1 - 2\,dy/dx}{1}$$

$$dy/dx = -2 - 2\,dy/dx$$

$$+2\,dy/dx \quad\quad +2\,dy/dx$$

$$3\,dy/dx = \frac{-2}{3} \quad\quad y+1 = -2/3(x-1)$$

Dec 2-8:48 AM

The slope of the tangent line is -1 at the point (0,1)

① on $x^3 - 6xy - ky^3 = a$ find a & K.

$$0^3 - 6(0)(1) - K(1)^3 = a$$

$$-K = a$$

② Take the derivative & set = -1

$$3x^2 - 6x\,dy/dx - 6y - 3ky^2\,dy/dx = 0$$

$$dy/dx \frac{(-6x - 3ky^2)}{-6x - 3ky^2} = \frac{-3x^2 + 6y}{-6x - 3ky^2}$$

$(0,1)$

$$\frac{-3x^2 + 6y}{-6x - 3ky^2} = -1$$

$$\frac{-3(0)^2 + 6(1)}{-6(0) - 3k(1)^2} = \frac{-1}{1}$$

$-K = a$
$\boxed{-2 = a}$

$$\frac{6}{-3k} = \frac{-1}{1} \quad\quad 3K = 6$$

$\boxed{K = 2}$

Dec 2-10:03 AM