May 8th

If a square is expanding at a rate of 24 m^2/sec. What is the perimeter of the square when the side is expanding at a rate of 4 m/sec?

May 8

Students will verbally explain how to find the second derivative using implicit differentiation

(using the words: chain rule, factor, y' , etc...)

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

$$\frac{3-4\cdot x^3}{3\cdot y^2+20\cdot y}$$

$4x^2y = \sin(x) + e^y$

$$\frac{\cos(x)-8\cdot x\cdot y}{4\cdot x^2-e^y}$$

$\tan^{-1}(x) + y^4 = xy^5$

$$\frac{1-y^5(1+x^2)}{(1+x^2)(5xy^4-4y^3)}$$

$$\frac{\frac{1}{1+x^2}-y^5}{5\cdot xy^4-4\cdot y^3}$$

$x^2+y^3=6$

find $\frac{dy}{dx}$

$x^2+y^3=6$

$2x+3y^2(y')=0$

$-3y^2(y') \quad -3y^2(y')$

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

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

find $\frac{d^2y}{dx^2}$

$\frac{d^2y}{dx^2} = y'' = \frac{-2(3y^2)-6y(y')(-2x)}{(3y^2)^2}$

$= \frac{-6y^2+12xy(y')}{(3y^2)^2} = \frac{-6y^2+12xy\left(\frac{-2x}{3y^2}\right)}{9y^4}$

$= \frac{-6y^2-\frac{24x^2y}{3y^2}}{9y^4} = \frac{-\frac{18y^4}{3y^2}-\frac{24x^2y}{3y^2}}{9y^4}$

$= \frac{-18y^4-24x^2y}{27y^6}$

$2xy = y^2 + 2y$

find $\frac{dy}{dx}$

$(2x)(y) = y^2 + 2y$

$2y + y'(2x) = 2y(y') + 2y'$

$-y'(2x) \qquad\qquad -y'(2x)$

$2y = 2y(y') + 2y' - y'(2x)$

$2y = y'(2y + 2 - 2x)$

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

find $\frac{d^2y}{dx^2}$

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

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