Check-up Time...Do I understand???

Given $x^2 - 3x^3y^2 + y^2 = 5xy^3 - 4$ Find $\frac{dy}{dx}$

$$2x - (9x^2y^2 + 3x^3(2y\frac{dy}{dx})) + 2y\frac{dy}{dx} = 5y^3 + 5x(3y^2\frac{dy}{dx})$$

$$(-6x^3y + 2y - 15xy^2)\frac{dy}{dx} = 5y^3 - 2x + 9x^2y^2 \quad +0$$

$$\frac{dy}{dx} = \frac{5y^3 - 2x + 9x^2y^2}{-6x^3y + 2y - 15xy^2}$$

Example:

This one has a bit of a twist...Let's take a look...

Find $\frac{dy}{dx}$, given the curve $x^2 - 3xy = (5x^2 - 8y)^5$

$$2x - \left(3y + 3x\frac{dy}{dx}\right) = 5(5x^2 - 8y)^4\left(10x - 8\frac{dy}{dx}\right)$$

$$2x - 3y - 3x\frac{dy}{dx} = 50x(5x^2 - 8y)^4 - 40(5x^2 - 8y)^4\frac{dy}{dx}$$

$$\left[40(5x^2 - 8y)^4 - 3x\right]\frac{dy}{dx} = 50x(5x^2 - 8y)^4 - 2x + 3y$$

$$\frac{dy}{dx} = \frac{50x(5x^2 - 8y)^4 - 2x + 3y}{40(5x^2 - 8y)^4 - 3x}$$

$$(x^7-3y^4)^8 - 2x^2y^3 = 6y^3 + 4x$$

$$8(x^7-3y^4)^7\left(7x^6-12y^3\frac{dy}{dx}\right)-\left(4xy^3+2x^2\left(3y^2\frac{dy}{dx}\right)\right)=18y^2\frac{dy}{dx}+4$$

$$56x^6(x^7-3y^4)^7-96y^3(x^7-3y^4)^7\frac{dy}{dx}-4xy^3-6x^2y^2\frac{dy}{dx}=18y^2\frac{dy}{dx}+4$$

$$56x^6(x^7-3y^4)^7-4xy^3-4=\left[18y^2+96y^3(x^7-3y^4)^7+6x^2y^2\right]\frac{dy}{dx}$$

$$\frac{dy}{dx}=\frac{56x^6(x^7-3y^4)^7-4xy^3-4}{18y^2+96y^3(x^7-3y^4)^7+6x^2y^2}$$

ex. $\sqrt{x^2+y^2} = 3x^3y^4$

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$\frac{1}{2}(x^2+y^2)^{-\frac{1}{2}}\left(2x+2y\frac{dy}{dx}\right) = 9x^2y^4 + 3x^3\left(4y^3\frac{dy}{dx}\right)$

What if we throw in some trigonometric functions??

EMBRACE A CHALLENGE...DON'T WAIT FOR SOMEONE TO HOLD YOUR HAND !!!

$$\cot(3xy^5) + \sec^3 5x = 4x^3 - \frac{6}{y^2}$$

$$-\csc^2(3xy^5)\left[3y^5 + 3x(5y^4)\frac{dy}{dx}\right] + 3(\sec 5x)^2 \sec 5x \tan 5x (5) = 12x^2 + 12y^{-3}\frac{dy}{dx}$$

$$-3y^5\csc^2(3xy^5) - 15xy^4\csc^2(3xy^5)\frac{dy}{dx} + 15\sec^2 5x \sec 5x \tan 5x = 12x^2 + 12y^{-3}\frac{dy}{dx}$$

$$-3y^5(\csc^2(3xy^5)) + 15\sec^3 5x \tan 5x - 12x^2 = \left[12y^{-3} + 15xy^4\csc^2(3xy^5)\right]\frac{dy}{dx}$$

$$\frac{dy}{dx} = \frac{-3y^5\csc^2(3xy^5) + 15\sec^3 5x \tan 5x - 12x^2}{12y^{-3} + 15xy^4\csc^2(3xy^5)}$$

Homework

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1 d, f, h

2 c, d

3 c, d

5 a

6 a, b, c