

Name: KEY

Read all directions and problems carefully! Show all appropriate work for credit.

1. Find $\frac{dy}{dx}$ by implicit differentiation for the following equation.

$$x^3 - xy = 4 - y^2$$

$$3x^2(1) - [(1)y + x \cdot (\frac{dy}{dx})] = 0 - 2y(\frac{dy}{dx})$$

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

$$+ x(\frac{dy}{dx}) \quad + x(\frac{dy}{dx})$$

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

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

(+5)

$$-2\sqrt{x} + \sqrt[3]{y} = y^{\frac{3}{2}}$$

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

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

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



$$7e^x + \ln y = -6x^2$$

$$7e^x(1) + \frac{1}{y} \left(\frac{dy}{dx} \right) = -6(2x)(1)$$

$$7e^x + \frac{1}{y} \left(\frac{dy}{dx} \right) = -12x - 7e^x$$

$$-7e^x + \left[\frac{1}{y} \left(\frac{dy}{dx} \right) \right] = (-12x - 7e^x) y$$

$$\frac{dy}{dx} = \boxed{y(-12x - 7e^x)}$$

(+5)

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

(+5)

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