Name: _____   Date: _____

Learning Goal 3.3	Using more derivative rules.

More Questions – Answers

1. Use implicit differentiation to find the following derivatives.

a. $y^2 = 1 + x^2$

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

b. $x^2 + xy + y^2 = 7$

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

c. $x^3 + xy^2 = y^3 + yx^2$

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

d. $4\cos x \sin y = 1$

$$\frac{dy}{dx} = \tan x \tan y$$

e. $\sqrt{x} + \sqrt{y} = 9$

$$\frac{dy}{dx} = -\frac{\sqrt{xy}}{x}$$

f. $\tan\left(\frac{x}{y}\right) = x + y$

$$\frac{dy}{dx} = \frac{y\sec^2\left(\frac{x}{y}\right) + y^2}{y^2 + x\sec^2\left(\frac{x}{y}\right)}$$

g. $\sin(x + y) = xy$

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

h. $\frac{1}{x} + \frac{1}{y} = 7$

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

i. $y = (x + 1)^2(x + 2)^3$

$$\frac{dy}{dx} = (5x + 7)(x + 1)(x + 2)^2$$

j. $y = (3x + 2)^4(5x - 1)^2$

$$\frac{dy}{dx} = 2(45x - 4)(3x + 2)^3(5x - 1)$$

k. $y = (x - 1)^2(x + 1)^3(x + 3)^4$

$$\frac{dy}{dx} = (9x^2 + 14x - 7)(x - 1)(x + 1)^2(x + 3)^3$$

l. $y = \frac{\sqrt{4 + 3x^2}}{\sqrt[3]{x^2 + 1}}$

$$\frac{dy}{dx} = \frac{x(3x^2 + 1)\sqrt[6]{(4 + 3x^2)^3(x^2 + 1)^4}}{(4 + 3x^2)(x^2 + 1)^2}$$