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

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

$$4x^4 + 4x^3y + x^4 + x^4\frac{dy}{dx} = 6xy\frac{dy}{dx} - 2y^2\frac{dy}{dx} + 3y^2 - y^2\frac{dy}{dx}$$

$$x^4\frac{dy}{dx} - 6xy\frac{dy}{dx} + 3y^2\frac{dy}{dx} = -5x^4 - 4x^3y + 3y^2$$

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

$$\frac{dy}{dx} = \frac{-5x^4 - 4x^3y + 3y^2}{x^4 - 6xy + 3y^2}$$

11. $x^2 y^2 + x \sin y = 4$

$$2xy^2 + x^2 2y \frac{dy}{dx} + 1 \cdot \sin y + x \cos y \cdot \frac{dy}{dx} = 0$$

$$x^2 2y \frac{dy}{dx} + x \cos y \frac{dy}{dx} = -2xy^2 - \sin y$$

$$\frac{dy}{dx} \left(2x^2 y + x \cos y \right) = -2xy^2 - \sin y$$

$$\frac{dy}{dx} = \frac{-2xy^2 - \sin y}{2x^2 y + x \cos y}$$

7. $x^2 + xy - y^2 = 4$

$$2x + x\frac{dy}{dx} + 1\cdot y - 2y\frac{dy}{dx} = 0$$

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

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

13. $4 \cos x \sin y = 1$ $\qquad 3x^2$

$4 \left(-\sin x \sin y + \cos x \cos y \cdot \dfrac{dy}{dx} \right) = 0$

$\cos x \cos y \dfrac{dy}{dx} = \sin x \sin y$

$\dfrac{dy}{dx} = \dfrac{\sin x \sin y}{\cos x \cos y} = \tan x \tan y$

17. $\sqrt{xy} = 1 + x^2 y$

$\hookrightarrow (xy)^{\frac{1}{2}}$

$\frac{1}{2}(xy)^{-\frac{1}{2}}\left(1 \cdot y + x\frac{dy}{dx}\right) = 2xy + x^2\frac{dy}{dx}$

$\frac{1}{2\sqrt{xy}}\left(y + x\frac{dy}{dx}\right) = 2xy + x^2\frac{dy}{dx}$

$\frac{y}{2\sqrt{xy}} + \frac{x}{2\sqrt{xy}}\frac{dy}{dx} = 2xy + x^2\frac{dy}{dx}$

$\frac{\sqrt{y}}{2\sqrt{x}} + \frac{\sqrt{x}}{2\sqrt{y}}\frac{dy}{dx} = 2xy + x^2\frac{dy}{dx}$

$\frac{dy}{dx}\left(\frac{\sqrt{x}}{2\sqrt{y}} - x^2\right) = 2xy - \frac{\sqrt{y}}{2\sqrt{x}}$

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

15. $e^{x/y} = x - y$

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

$$\frac{e^{x/y}}{y} - \frac{xe^{x/y}}{y^2}\frac{dy}{dx} = 1 - \frac{dy}{dx}$$

$$\frac{dy}{dx}\left(1 - \frac{xe^{x/y}}{y^2} \right) = 1 - \frac{e^{x/y}}{y}$$