p.146 Find $\frac{dy}{dx}$ by implicit differentiation.

(2) $x^2 - y^2 = 25$

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

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

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

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

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

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

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

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

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

(14) $\cot y = x - y$

$-\frac{dy}{dx}\csc^2 y = 1 - \frac{dy}{dy}$

$\frac{dy}{dx} - \frac{dy}{dx}\csc^2 y = 1$

$\frac{dy}{dx}(1 - \csc^2 y) = 1$

$\frac{dy}{dx} = \frac{1}{-\cot^2 y} = -\tan^2 y$

(10) $4\cos x \sin y = 1$

$-4\sin x \sin y + \frac{dy}{dx}\cos y \cdot 4\cos x = 0$

$\frac{dy}{dx}\cdot 4\cos x\cos y = 4\sin x \sin y$

$\frac{dy}{dx} = \frac{\cancel{4}\sin x\sin y}{\cancel{4}\cos x\cos y}$

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

(30) $(4-x)y^2 = x^3$ at $(2,2)$

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

$8y\frac{dy}{dx} - [y^2 + x\cdot 2y\frac{dy}{dx}] = 3x^2$

$16\frac{dy}{dx} - [4 + 8\frac{dy}{dx}] = 3\cdot 4$

$8\frac{dy}{dx} = 16$

$\frac{dy}{dx} = 2$

(28) $x\cos y = 1$ at $(2, \pi/3)$

$\cos y + x(-\sin y)\frac{dy}{dx} = 0$

$\cos\pi/3 = 2\sin\pi/3\cdot\frac{dy}{dx}$

$1/2 = 2\cdot\sqrt{3}/2\cdot\frac{dy}{dx}$

$\frac{1}{2\sqrt{3}} = \frac{dy}{dx}$

42 a) $\frac{x^2}{6} - \frac{y^2}{8} = 1$ at $(3,-2)$

$$\frac{2x}{6} - \frac{2y}{8}\frac{dy}{dx} = 0$$

$$\frac{x}{3} - \frac{y}{4}\cdot\frac{dy}{dx} = 0$$

$$\frac{3}{3} = \frac{-2}{4}\frac{dy}{dx}$$

$$1 = -1/2\, dy/dx$$

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

Tangent Line

$y+2=-2(x-3)$

$y+2=-2x+6$

$y=-2x+4$

Normal Line:

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

34 $(x+2)^2+(y-3)^2=37$ at $(4,4)$

$$2(x+2)+2(y-3)\frac{dy}{dx}=0$$

$$2(6)+2(1)\frac{dy}{dy}=0$$

$$\frac{2dy}{dx}=-12$$

$$dy/dx=-6$$

$y-4=-6(x-4)$

$y-4=-6x+24$

$y=-6x+28$