1) $x^3+y^3=18xy$

$3x^2+3y^2\frac{dy}{dx}=18x\frac{dy}{dx}+y18$

$3y^2\frac{dy}{dx}-18x\frac{dy}{dx}=18y-3x^2$

$(3y^2-18x)\frac{dy}{dx}=18y-3x^2$

$$\frac{dy}{dx}=\frac{18y-3x^2}{3y^2-18x}$$

2) $x^2y+xy^2=6$

$x^2\left[\frac{dy}{dx}\right]+y[2x]+x2y\frac{dy}{dx}+y^2=0$

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

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

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

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

3) $x^3-xy+y^3=1$

$3x^2-x\left[\frac{dy}{dx}\right]+y[-1]+3y^2\left[\frac{dy}{dx}\right]=0$

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

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

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

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

4) $x+xy=y^2+2xy$

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

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

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

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

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

5) $(3xy+7)^2=6y$

$2(3xy+7)[3x\frac{dy}{dx}+y[3]]=6\frac{dy}{dx}$

$2(3xy+7)(3x\frac{dy}{dx}+3y)=6\frac{dy}{dx}$

$(6xy+14)(3x\frac{dy}{dx}+3y)=6\frac{dy}{dx}$

$18x^2y\frac{dy}{dx}+18xy^2+42x\frac{dy}{dx}+42y=6\frac{dy}{dx}$

$18x^2y\frac{dy}{dx}+42x\frac{dy}{dx}-6\frac{dy}{dx}=-18xy^2-42y$

$6\frac{dy}{dx}(3x^2y+7x-1)=6(-3xy^2-7y)$

$$\frac{dy}{dx}=\frac{-3xy^2-7y}{3x^2y+7x-1}$$

6) $4-x^3y^2=3y$

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

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

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

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

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

7) $4x - \cos y = 2y^2$

$4 + \sin y \frac{dy}{dx} = 4y \frac{dy}{dx}$

$\sin y \frac{dy}{dx} - 4y \frac{dy}{dx} = -4$

$(\sin y - 4y)\frac{dy}{dx} = -4$

$$\frac{dy}{dx} = \frac{-4}{\sin y - 4y}$$

8) $\cot(xy) + 4 = 2x$

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

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

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

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

10) $x = \tan(2y)$

$1 = \sec^2(2y)\, 2\frac{dy}{dx}$

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

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

11) $x = \sin y$

$1 = \cos y \frac{dy}{dx}$

$\frac{dy}{dx} = \frac{1}{\cos y}$

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

12) $4x\sin y + y^2\cos x = 3$

$4x\cos y \frac{dy}{dx} + 4\sin y + y^2(-\sin x) + \cos x\, 2y\frac{dy}{dx} = 0$

$4x\cos y \frac{dy}{dx} + 2y\cos x \frac{dy}{dx} = +y^2\sin x - 4\sin y$

$(4x\cos y + 2y\cos x)\frac{dy}{dx} = y^2\sin x - 4\sin y$

$$\frac{dy}{dx} = \frac{y^2\sin x - 4\sin y}{4x\cos y + 2y\cos x}$$

13) $2y = \frac{x-1}{x+1}$

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

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

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

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

14) $2xy + \pi\sin y = 2\pi$

$2x\frac{dy}{dx} + 2y + \pi\cos y\frac{dy}{dx} = 0$

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

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

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

15) $x\sin 2y = y\cos 3x$

$x[2\cos 2y \frac{dy}{dx}] + \sin 2y = y(-3\sin x) + \cos 3x \frac{dy}{dx}$

$2x\cos 2y \frac{dy}{dx} + \sin 2y = -3y\sin x + \cos 3x \frac{dy}{dx}$

$2x\cos 2y \frac{dy}{dx} - \cos 3x\frac{dy}{dx} = -3y\sin x - \sin 2y$

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

$$\frac{dy}{dx} = \frac{-3y\sin x - \sin 2y}{2x\cos 2y - \cos 3x}$$

16) $x^2\cos^2 y - \sin y = 0$

$x^2[2\cos y][-\sin y\frac{dy}{dx}] + \cos^2 y \cdot 2x - \cos y = 0$

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

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

17) $\tan x - 2xy = y^3$

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

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

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

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

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

23) $6x^2 + 3xy + 2y^2 + 17y = 6 \quad (-1, 0)$

$12x + 3x\frac{dy}{dx} + 3y + 4y\frac{dy}{dx} + 17\frac{dy}{dx} = 0$

$3x\frac{dy}{dx} + 4y\frac{dy}{dx} + 17\frac{dy}{dx} = -12x - 3y$

$(3x + 4y + 17)\frac{dy}{dx} = -12x - 3y$

$\frac{dy}{dx} = \frac{-12x - 3y}{3x + 4y + 17}$

$\frac{dy}{dx} = \frac{12}{-3 + 17} = \frac{12}{14} = \boxed{\frac{6}{7}}$

$y - 0 = \frac{6}{7}(x + 1)$

$$\boxed{y = \frac{6}{7}x + \frac{6}{7}}$$

18) $x^2 + y^2 = 4$

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

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

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

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

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

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

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

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

19) $y^2 = 2x + x^2$

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

$\frac{dy}{dx} = \frac{1 + x}{y}$

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

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

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

20) $y^2 + 2y = 2x + 1$

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

$y\frac{dy}{dx} + \frac{dy}{dx} = 1$

$(y + 1)\frac{dy}{dx} = 1$

$\frac{dy}{dx} = \frac{1}{y + 1}$

$\frac{d^2y}{dx} = \frac{(y + 1)0 - 1\left(\frac{dy}{dx}\right)}{(y + 1)^2}$

$\frac{d^2y}{dx} = \frac{-dy/dx}{(y + 1)^2}$

$$\boxed{\frac{d^2y}{dx} = \frac{-1}{(y + 1)^3}}$$

21) $x^2 + xy - y^2 = 1 \quad (2, 3)$

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

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

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

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

$\frac{dy}{dx} = \frac{-2(2) - 3}{-2 - 2(3)} = \frac{-7}{-8} = \frac{7}{8}$

$y - 3 = \frac{7}{8}(x - 2)$

$y - 3 = \frac{7}{8}x - \frac{7}{4}$

$$\boxed{y = \frac{7}{8}x + \frac{5}{4}}$$

22) $x^2y^2 = 9 \quad (3, -4)$

$x^2\left[2y\frac{dy}{dx}\right] + y^2[2x] = 0$

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

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

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

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

$\rightarrow$ [illegible]

$y + 4 = \frac{4}{3}(x - 3)$

$y + 4 = \frac{4}{3}x - 4$

$$\boxed{y = \frac{4}{3}x - 8}$$