5.) $\frac{d}{dx}\left(x^3 - xy + y^2 = 7\right)$

$$3x^2\cancel{\frac{dx}{dx}} - \left(x\frac{dy}{dx} + y\cdot\cancel{\frac{dx}{dx}}\right) + 2y\frac{dy}{dx} = 0$$

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

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

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

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

47.) $\frac{d}{dx}\left(x^2 - y^2 = 36\right)$

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

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

$\frac{d}{dx}\left(\frac{dy}{dx} = \frac{x}{y}\right)$

$\frac{d^2y}{dx^2} = \frac{y\cdot 1 - x\cdot\frac{dy}{dx}}{y^2}$

$\frac{d^2y}{dx^2}$

$\left(\frac{y - x\left(\frac{x}{y}\right)}{y^2}\right)\cdot\frac{y}{y}$

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

$= \frac{-36}{y^3}$

definition of derivative (use limits)

alternate form of the derivative

differentiability (no corners, cusps, vertical tangents, disc.)

derivative rules (power rule, trig, product, quotient, chain,
implicit

equation of tangent lines

slopes f'(c)

find the points where f(x) has horizontal tangents

find a and b so that f(x) is continuous and differentiable

Chart questions with derivatives