DATE	CONCEPT	IN-CLASS SAMPLE PROBLEMS
	IMPLICIT DIFFERENTIATION	

Ex. 1 Find $\frac{dy}{dx}$ for $y^2 = x$.

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

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

Ex. 2 Find $\frac{dy}{dx}$ for $2y = x^2 + \sin y$.

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

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

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

Ex. 3 Find the equations of the tangent and normal line for $x^2 - xy + y^2 = 7$ at $(-1,2)$

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

$-2 - \left(-\frac{dy}{dx} + 2\right) + 4\frac{dy}{dx} = 0$

$5\frac{dy}{dx} = 4$

$\left.\frac{dy}{dx}\right|_{(-1,2)} = \frac{4}{5}$

T: $y - 2 = \frac{4}{5}(x+1)$

N: $y - 2 = -\frac{5}{4}(x+1)$

Ex. 4 Find $\frac{d^2y}{dx^2}$ for $x^2 - y^2 = 16$ in terms of x and y.

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

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

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

$= \frac{y - \frac{x}{y}\cdot x}{y^2}$

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

$= \frac{y^2 - x^2}{y^3} = \frac{-16}{y^3}$

AP MULTIPLE CHOICE

What is the slope of the line tangent to the curve $y + 2 = \frac{x^2}{2} - 2\sin y$ at the point $(2, 0)$?

(A) -2 (B) 0 (C) $\frac{1}{2}$ (D) $\frac{2}{3}$ (E) 2

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

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

HOMEWORK	Worksheet 15