

1-10: Find dy/dx by implicit differentiation.

1. $x^3 + y^3 = 1$

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

3. $2x^3 + x^2y - xy^3 = 2$

4. $xe^y = x - y$

5. $y \cos x = x^2 + y^2$

6. $\cos(xy) = 1 + \sin y$

7. $4 \cos x \sin y = 1$

8. $e^y \sin x = x + xy$

9. $e^{\frac{x}{y}} = x - y$

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

11-12: Use implicit differentiation to find an equation of the tangent line to the curve at the given point.

11. $\sin 2x = x \cos 2y$, $\left(\frac{\pi}{2}, \frac{\pi}{4}\right)$

12. $x^2 + 2xy - y^2 + x = 2$, $(1, 2)$

13-14: Find y'' by implicit differentiation.

13. $9x^2 + y^2 = 9$

14. $x^4 + y^4 = a^4$ $a^4 = \text{constant}$

AP Calculus
Implicit Differentiation
Review

Name _____ Pd. ____
Derivatives (2) Day 1

$$15. \lim_{x \rightarrow 3^+} \frac{-2}{x-3}$$

$$16. \lim_{x \rightarrow \infty} \frac{-2}{x-3}$$

$$17. g(x) = 5^{x^2} \text{ find } g'(x)$$

$$18. h(x) = (3x-2)^2(2x+5)^5 \text{ find } h'(x)$$

$$19. f(x) = \frac{-2}{x-3} \text{ find } f'(x)$$

$$20. k(x) = \sin^3(x^2) \text{ find } k'(x)$$

Answers:

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

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

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

$$4) \frac{dy}{dx} = \frac{1-e^y}{xe^y+1}$$

$$5) \frac{dy}{dx} = \frac{2x+y \sin x}{\cos x - 2y}$$

$$6) \frac{dy}{dx} = \frac{y \sin(xy)}{-x \sin(xy) - \cos y}$$

$$7) \frac{dy}{dx} = \frac{\sin x \sin y}{\cos x \cos y} = \tan x \tan y$$

$$8) \frac{dy}{dx} = \frac{1+y-e^y \cdot \cos x}{\sin x \cdot e^y - x}$$

$$9) \frac{dy}{dx} = \frac{y^2 - y \cdot e^{\frac{x}{y}}}{y^2 - x \cdot e^{\frac{x}{y}}}$$

$$10) \frac{dy}{dx} = \frac{4xy^2\sqrt{x+y}-1}{1-4x^2y\sqrt{x+y}}$$

$$11) y - \frac{\pi}{4} = \frac{2}{\pi} \left(x - \frac{\pi}{2} \right)$$

$$12) y - 2 = \frac{7}{2}(x - 1)$$

$$13) \frac{dy}{dx} = \frac{-9x}{y}$$

$$14) \frac{dy}{dx} = \frac{-x^3}{y^3}$$

$$15) -\infty$$

$$\frac{d^2y}{dx^2} = \frac{-81}{y^3}$$

$$\frac{d^2y}{dx^2} = \frac{-3x^2a^4}{y^7}$$

$$16) 0$$

$$17) g'(x) = \ln 5 \cdot 2x \cdot 5^{x^2}$$

$$18) h'(x) = 2(3x-2)(2x+5)^4(21x+5)$$

$$19) f'(x) = \frac{2}{(x-3)^2}$$

$$20) k'(x) = 6x \sin^2(x^2) \cos(x^2)$$