

Section 3.1: Implicit Differentiation

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

3. $x^2 + y^2 = 1000$

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

7. $\frac{1}{\sqrt{x}} + \frac{1}{\sqrt{y}} = 1$

9. $\sin(x^2y^2) = x$

11. $\tan^3(xy^2 + y) = x$

Find $\frac{d^2y}{dx^2}$ by implicit differentiation.

13. $2x^2 - 3y^2 = 4$

15. $x^3y^3 - 4 = 0$

17. $y + \sin y = x$

19. Find the slope of the tangent line to the curve $x^2 + y^2 = 1$ at $x = \frac{1}{2}$.

Use implicit differentiation to find the specified derivative.

29. $a^4 - t^4 = 6a^2t$; $\frac{da}{dt}$

31. $a^2\omega^2 + b^2\lambda^2 = 1$; $\frac{d\omega}{d\lambda}$ (a and b are constants)

33. In the accompanying figure, it appears that the ellipse $x^2 + xy + y^2 = 3$ has horizontal tangent lines at the points of intersection of the ellipse and the line $y = -2x$. Use implicit differentiation to explain why this is the case.

