

Implicit Differentiation - Homework

1. Find $\frac{dy}{dx}$ for $xy = 8$ at $(-8, -1)$

$$-\frac{1}{8}$$

2. Find $\frac{dy}{dx}$ for $x^2 - y^3 = 0$ at $(1, 1)$

$$\frac{2}{3}$$

3. Find $\frac{dy}{dx}$ for $\sqrt{x} + \sqrt{y} = 9$ at $(16, 25)$

$$-\frac{5}{4}$$

4. Find $\frac{dy}{dx}$ for $x^3 - xy + y^2 = 4$ at $(0, -2)$

$$\frac{1}{2}$$

5. Find $\frac{dy}{dx}$ for $x^2y - xy^2 = -6$ at $(2, -1)$

$$\frac{5}{8}$$

6. Find $\frac{dy}{dx}$ for $(x+y)^3 = x^3 + y^3$ at $(-1, 1)$

$$-1$$

7. Find $\frac{dy}{dx}$ for $\sqrt{xy} = x - 2y$ at $(4, 1)$

$$\frac{1}{4}$$

8. Find $\frac{dy}{dx}$ for $x \cos y = 1$ at $\left(2, \frac{\pi}{3}\right)$

$$\frac{1}{2\sqrt{3}}$$

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

* 9. Find $\frac{dy}{dx}$ for $x^3y - y = x$

$$y' = \frac{1 - 3x^2y}{x^3 - 1}$$

10. Find $\frac{dy}{dx}$ for $\sin x + 2\cos 2y = 1$

$$y' = \frac{\cos x}{4 \sin(2y)}$$

11. Find $\frac{dy}{dx}$ for $2\sin x \cos y = 1$

$$y' = \cot x \cdot \cot y$$

12. Find $\frac{dy}{dx}$ for $\tan(x+y) = y$

$$y' = \frac{\sec^2(x+y)}{1 - \sec^2(x+y)}$$

$$y' = -\csc^2(x+y)$$

13. Given $1 - xy = x - y$, find $\frac{d^2y}{dx^2}$

$$y'' = \frac{2y + 2}{(1-x)^2}$$

14. Find the equations of the lines both tangent and normal to $x^3 + y^3 = 2xy$ at $(1, 1)$

$$m_{\tan} = -1 \quad y = -x + 2$$

$$m_{\perp} = 1 \quad y = x$$

15. Find the points at which the graph of $x^2 + 4y^2 - 4x + 16y + 4 = 0$ has a vertical and horizontal tangent line.

$$y' = \frac{2-x}{4y+8}$$

$$m_{\tan} = 0 \quad @ \quad x = 2$$

$$(2, 0) + (2, 4)$$

Vertical tangent
m is undefined.

$$4y + 8 = 0$$

$$y = -2$$

$$(6, -2) + (-2, -2)$$