

Homework Set 6

Sect 2.6: Implicit Differentiation

1. Consider: $5x^2 - x + xy = 2$
 - a. Use implicit differentiation to find $\frac{dy}{dx}$.

 - b. Solve the given equation for y . Then find $\frac{dy}{dx}$ without using implicit differentiation.

 - c. Verify that the answers for parts (a) and (b) are equivalent.

2. Consider: $x = e^y$
 - a. Use implicit differentiation to find $\frac{dy}{dx}$.

 - b. Solve the given equation for y . Then find $\frac{dy}{dx}$ without using implicit differentiation.

 - c. Verify that the answers for parts (a) and (b) are equivalent.

3. Given that $g(x) + x \sin g(x) = x^2$, find $g'(0)$ where $g(0) = \frac{3\pi}{2}$.

Use implicit differentiation to compute the derivative $\frac{dy}{dx}$.

4. $x^2 + 2xy - y^2 + x = 2$ when $x = 1$ and $y = 2$

5. $x^2 + y^2 = (2x^2 + 2y^2 - x)^2$ when $x = 0$ and $y = \frac{1}{2}$

6. $\ln\left(\frac{x}{y}\right) = x + y$

7. $e^{x^2y} = x + y$

8. $\arctan(xy) = 1 + x^2y$

9. $x^{2/3} + y^{2/3} = 4$ when $x = -3\sqrt{3}$ and $y = 1$

Use implicit differentiation to compute the 2nd derivative $\frac{d^2y}{dx^2}$ of the following relations. Be sure to write the second derivative only in terms of the x and y .

10. $5x^2 + y^2 = 5$