

Section 3: Implicit differentiation

Crucial points

1. **Make sure that you understand the process of differentiating an equation implicitly**

Example: Differentiate implicitly $x^2 + 2y^2 = 10$

✗ **Wrong**

$$\begin{aligned}x^2 + 2y^2 &= 10 \\ \Rightarrow \frac{dy}{dx} &= 2x + 4y \frac{dy}{dx} \\ \Rightarrow \frac{dy}{dx} (1 - 4y) &= 2x \\ \Rightarrow \frac{dy}{dx} &= \frac{2x}{1 - 4y}\end{aligned}$$

✓ **Right**

Differentiating the equation implicitly:

$$\begin{aligned}2x + 4y \frac{dy}{dx} &= 0 \\ \Rightarrow \frac{dy}{dx} &= -\frac{2x}{4y} = -\frac{x}{2y}\end{aligned}$$