

Degree and Order

Aim

To introduce the concept of the degree and order of a differential equation.

Learning Outcomes

At the end of this section you will:

- Know how to determine the order of a differential equation,
- Know how to determine the degree of a differential equation.

Differential equations are often classified with respect to **order**. The order of a differential equation is the order of the highest order derivative present in the equation.

Example 1

$$\frac{d^3y}{dx^3} + 4x \left(\frac{dy}{dx} \right)^2 = y \frac{d^2y}{dx^2} + e^y \quad \text{has order 3.}$$

The **degree** of a differential equation is the power of the highest order derivative in the equation. In previous example the degree is 1.

Example 2

$$\left(\frac{d^2y}{dx^2} \right)^3 + \frac{dy}{dx} = \sin x \quad \text{is of order 2 and degree 3.}$$

Related Reading

Stewart, J. 1999. *Calculus*. 4th Edition. Brooks/Cole Publishing Company.

Jacques, I. 1999. *Mathematics for Economics and Business*. 3rd Edition. Prentice Hall.