

Section 1: Introduction

Exercise level 1

1. In each case find the general solution of the differential equation and sketch the family of solution curves represented by the general solution.

(i) $\frac{dy}{dx} = -\frac{x}{y}$

(ii) $\frac{dy}{dx} = \frac{y}{x}$

(iii) $\frac{dy}{dx} = e^x$

(iv) $\frac{dy}{dx} = e^{-y}$

2. (i) Find the general solution to the differential equation $\frac{dy}{dx} = \frac{\sqrt{x}}{2y}$.

Write your answer in the form $y^2 = f(x)$

- (ii) Find the particular solution which passes through the point (1, 0).

3. (i) Find the general solution to the differential equation $\frac{dx}{dt} = \frac{8}{x}$.

(ii) Find the particular solution for which $x = 3$ when $t = 1$.

(iii) Sketch the particular solution curve.