

Chapter 2. First-order Differential Equations

Objectives

1. know the meaning of **separable equations**

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2. learn how to solve separable equations

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2. learn how to solve separable equations
3. learn how to find **hidden solutions** when they exist

§2.2 Separable Equations

► *separable equations* :

ex) Check if a differential equation $\frac{dy}{dx} = 2xy$ is separable or not.

ex) Check if a differential equation $\frac{dy}{dx} = \frac{2x+xy}{y^2+1}$ is separable or not.

non-ex)

§2.2 Separable Equations

- ▶ solving separable equations

1.

2.

3.

4.

§2.2 Separable Equations

ex) Solve the equation

$$\frac{dy}{dx} = \frac{6x^5 - 2x + 1}{\cos y + e^y}$$

§2.2 Separable Equations

ex) Solve the initial value problem

$$\frac{dy}{dx} = \frac{y-1}{x+3}, \quad y(-1) = 0$$

§2.2 Separable Equations

- ▶ Justification

§2.2 Separable Equations

► hidden solution

ex) Solve the equation

$$\frac{dy}{dx} = (x - 3)(y + 1)^{\frac{2}{3}}$$

Remark

1 Minute Self Check

1. Can you check if a given differential equation is **separable** or not?

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2. Can you solve a separable equation?

1 Minute Self Check

1. Can you check if a given differential equation is **separable** or not?
2. Can you solve a separable equation?
3. Can you find a **hidden solution** when it exist?