

8.3: Separable Differential Equations

Find the general solution of each differential equation.

1) $\frac{dy}{dx} = \frac{2e^x}{y^2}$

2) $\frac{dy}{dx} = \frac{2x}{y^2}$

For each problem, find the particular solution of the differential equation that satisfies the initial condition.

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

4) $\frac{dy}{dx} = \frac{2x}{e^{2y}}, y(0) = 0$

5) $\frac{dy}{dx} = 3xy^2, y(-1) = -\frac{1}{2}$

6) $\frac{dy}{dx} = 2x\sqrt{y}, y(1) = \frac{9}{4}$

$$7) \frac{dy}{dx} = \frac{e^x}{y^2}, y(1) = \sqrt[3]{3e+1}$$

$$8) \frac{dy}{dx} = \frac{2x}{y^2}, y(1) = \sqrt[3]{5}$$

Answers to 8.3: Separable Differential Equations

$$1) \frac{y^3}{3} = 2e^x + C_1 \\ y = \sqrt[3]{6e^x + C}$$

$$2) \frac{y^3}{3} = x^2 + C_1 \\ y = \sqrt[3]{3x^2 + C}$$

$$3) \frac{y^3}{3} = \frac{x^4}{2} + 1 \\ y = \sqrt[3]{\frac{3x^4}{2} + 3}$$

$$4) \frac{e^{2y}}{2} = x^2 + \frac{1}{2} \\ y = \frac{\ln(2x^2 + 1)}{2}$$

$$5) -\frac{1}{y} = \frac{3x^2}{2} + \frac{1}{2} \\ y = -\frac{2}{3x^2 + 1}$$

$$6) 2\sqrt{y} = x^2 + 2 \\ y = \left(\frac{x^2}{2} + 1\right)^2$$

$$7) \frac{y^3}{3} = e^x + \frac{1}{3} \\ y = \sqrt[3]{3e^x + 1}$$

$$8) \frac{y^3}{3} = x^2 + \frac{2}{3} \\ y = \sqrt[3]{3x^2 + 2}$$