

## 8.4: Separable Differential Equations Practice with Exponents and Logs

Find the general solution of each differential equation.

1)  $\frac{dy}{dx} = \frac{y+1}{x}$

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

3)  $\frac{dy}{dx} = \frac{3e^x}{y^2}$

4)  $\frac{dy}{dx} = 6x^2y$

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

5)  $\frac{dy}{dx} = 2y + 3, y(0) = -1$

6)  $\frac{dy}{dx} = 9x^2y, y(-2) = -\frac{3}{e^{24}}$

7)  $\frac{dy}{dx} = \frac{2x}{y}, y(1) = -\sqrt{3}$

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

## Answers to 8.4: Separable Differential Equations Practice with Exponents and Logs

$$\begin{array}{lll} 1) \ln |y + 1| = \ln |x| + C_1 & 2) \frac{y^3}{3} = -x + \frac{x^3}{3} + C_1 & 3) \frac{y^3}{3} = 3e^x + C_1 \\ y = Cx - 1 & y = \sqrt[3]{x^3 - 3x + C} & y = \sqrt[3]{9e^x + C} \\ 4) \ln |y| = 2x^3 + C_1 & 5) \frac{\ln |2y + 3|}{2} = x & 6) \ln |y| = 3x^3 + \ln 3 + 24 \\ y = Ce^{2x^3} & y = \frac{e^{2x} - 3}{2} & y = -3e^{3x^3} \\ 7) \frac{y^2}{2} = x^2 + \frac{1}{2} & 8) \frac{y^3}{3} = e^x + \frac{1}{3} & \\ y = -\sqrt{2x^2 + 1} & y = \sqrt[3]{3e^x + 1} & \end{array}$$