

## Separable Differential Equations

Find the general solution of each differential equation.

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

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

3)  $\frac{dy}{dx} = xe^y$

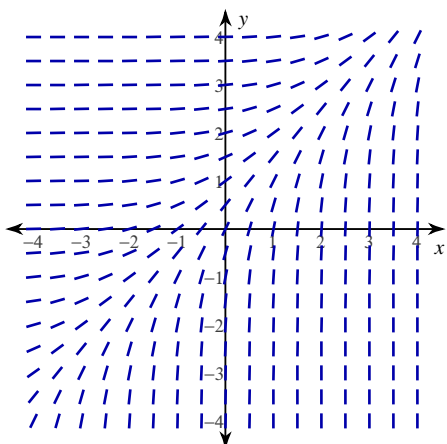
4)  $\frac{dy}{dx} = \frac{2x}{e^{2y}}$

5)  $\frac{dy}{dx} = 2y - 1$

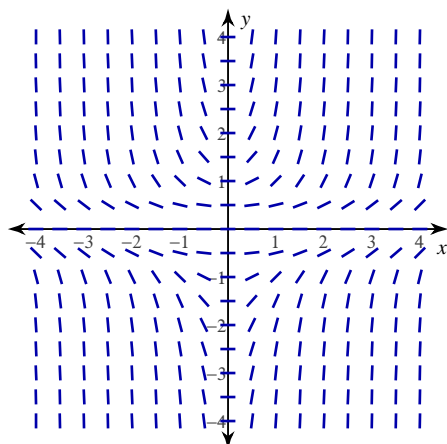
6)  $\frac{dy}{dx} = 2yx + yx^2$

For each problem, find the particular solution of the differential equation that satisfies the initial condition. You may use a graphing calculator to sketch the solution on the provided graph.

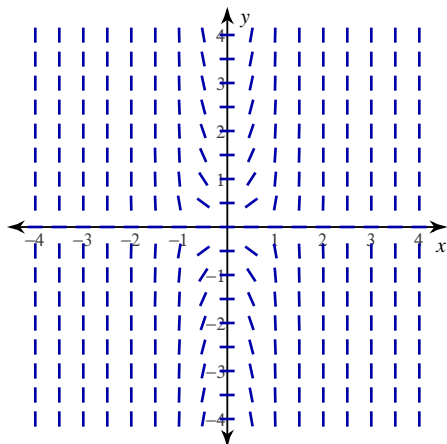
7)  $\frac{dy}{dx} = 2e^{x-y}$ ,  $y(1) = \ln(2e + 1)$



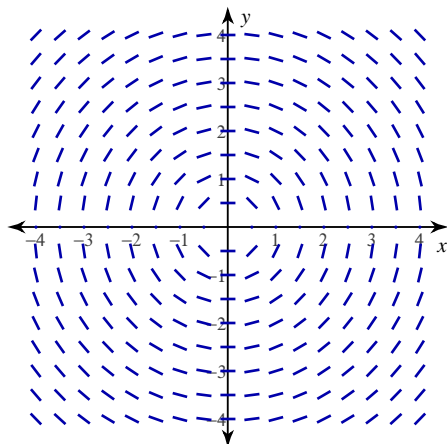
8)  $\frac{dy}{dx} = xy^2$ ,  $y(2) = -\frac{2}{5}$



9)  $\frac{dy}{dx} = 12x^3y$ ,  $y(0) = 2$



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



## Separable Differential Equations

Find the general solution of each differential equation.

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

$$e^y = e^x + C$$

$$y = \ln(e^x + C)$$

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

$$\tan y = x + C$$

$$y = \tan^{-1}(x + C)$$

$$3) \frac{dy}{dx} = xe^y$$

$$-e^{-y} = \frac{x^2}{2} + C_1$$

$$y = -\ln\left(-\frac{x^2}{2} + C\right)$$

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

$$\frac{e^{2y}}{2} = x^2 + C_1$$

$$y = \frac{\ln(2x^2 + C)}{2}$$

$$5) \frac{dy}{dx} = 2y - 1$$

$$\frac{\ln|2y-1|}{2} = x + C_1$$

$$y = \frac{Ce^{2x} + 1}{2}$$

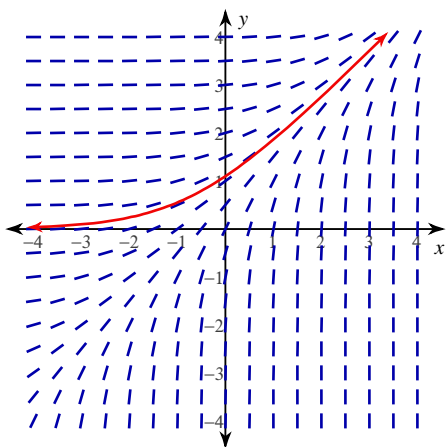
$$6) \frac{dy}{dx} = 2yx + yx^2$$

$$\ln|y| = x^2 + \frac{x^3}{3} + C_1$$

$$y = Ce^{x^2 + \frac{x^3}{3}}$$

For each problem, find the particular solution of the differential equation that satisfies the initial condition. You may use a graphing calculator to sketch the solution on the provided graph.

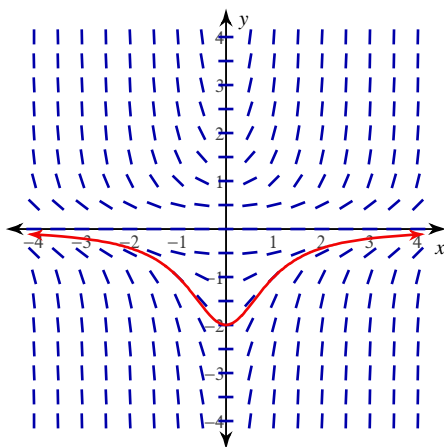
7)  $\frac{dy}{dx} = 2e^{x-y}$ ,  $y(1) = \ln(2e + 1)$



$$e^y = 2e^x + 1$$

$$y = \ln(2e^x + 1)$$

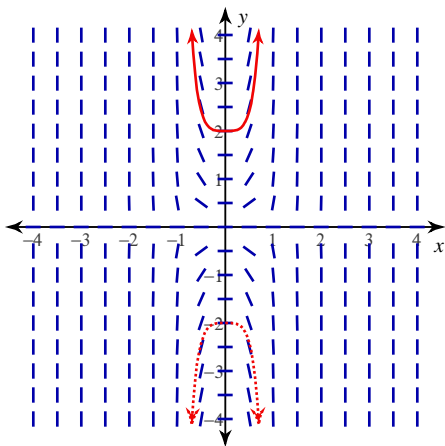
8)  $\frac{dy}{dx} = xy^2$ ,  $y(2) = -\frac{2}{5}$



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

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

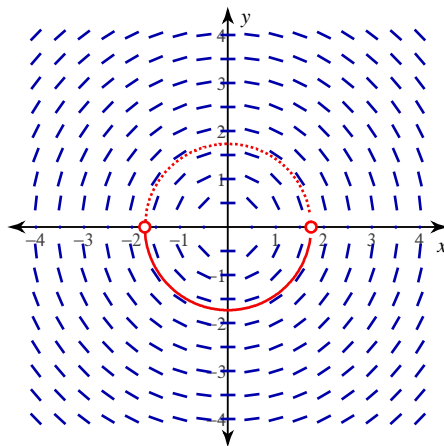
9)  $\frac{dy}{dx} = 12x^3y$ ,  $y(0) = 2$



$$\ln |y| = 3x^4 + \ln 2$$

$$y = 2e^{3x^4}$$

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



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

$$y = -\sqrt{-x^2 + 3}, -\sqrt{3} < x < \sqrt{3}$$