

Name: _____

Solve the following problems.

1. Find a solution to the initial value problem

$$\begin{aligned}\frac{dy}{dx} &= e^y x^3 \\ y(0) &= 0\end{aligned}$$

2. Find a solution to the initial value problem

$$\begin{aligned}\frac{dy}{dx} &= (1 + y^2)e^x \\ y(0) &= 0\end{aligned}$$

3. Find a solution to the initial value problem

$$\begin{aligned}\frac{dy}{dx} &= y\sqrt{y^2 - 1}\cos(x) \\ y(0) &= 1\end{aligned}$$

4. Find the general solution to the differential equation

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

5. Find the general solution to the differential equation

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

6. Find a solution to the initial value problem

$$\begin{aligned} \frac{dy}{dx} &= (y - 1) \frac{1}{x} \\ y(-1) &= 0 \end{aligned}$$

7. Find a solution to the initial value problem

$$\begin{aligned} x \frac{dy}{dx} + 2y &= -\frac{\sin(x)}{x} \\ y\left(\frac{\pi}{2}\right) &= 1 \end{aligned}$$