

## MAT 2384-Practice Problems on Linear First Order ODEs and Bernoulli Equation

For each of the following ODEs, Find the General Solution. If an initial condition is given, find also the corresponding particular solution.

$$1. \ x^2y' + 3xy = \frac{1}{x}, \quad y(1) = -1$$

$$2. \ y' + ky = e^{2kx}, \text{ where } k \text{ is a nonzero constant}$$

$$3. \ y' + 2y \sin(2x) = 2e^{\cos(2x)}, \quad y(0) = 0$$

$$4. \ y' + 4ycot(2x) = 6\cos(2x), \quad y\left(\frac{\pi}{4}\right) = 2$$

$$5. \ y' + \frac{y}{x^2} = 2xe^{\frac{1}{x}}, \quad y(1) = 13.86$$

$$6. \ y' + y = y^2, \quad y(0) = -1$$

$$7. \ y' + (x+1)y = e^{x^2}y^3, \quad y(0) = \frac{1}{2}$$

$$8. \ 2yy' + y^2 \sin(x) = \sin(x), \quad y(0) = \sqrt{2}$$