

### Problem 3

In each of Problems 1 through 8, solve the given differential equation.

$$y' + y^2 \sin x = 0$$

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#### Solution

Bring  $y^2 \sin x$  to the right side.

$$y' = -y^2 \sin x$$

This ODE is separable because it is of the form  $y' = f(x)g(y)$ , so it can be solved by separating variables.

$$\frac{dy}{y^2} = -\sin x \, dx$$

Bring the terms with  $y$  to the left and bring the terms with  $x$  to the right.

$$\frac{dy}{y^2} = -\sin x \, dx$$

Integrate both sides.

$$\int \frac{dy}{y^2} = \int (-\sin x) \, dx$$
$$-\frac{1}{y} = \cos x + C$$

Therefore,

$$y(x) = -\frac{1}{\cos x + C}.$$