

## Problem 8

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

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

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### Solution

This ODE is separable because it is of the form  $y' = f(x)g(y)$ , so it can be solved by separating variables. Bring the terms with  $y$  to the left and bring the terms with  $x$  to the right.

$$(1 + y^2) dy = x^2 dx$$

Integrate both sides.

$$\int (1 + y^2) dy = \int x^2 dx$$

$$y + \frac{y^3}{3} = \frac{x^3}{3} + C$$

The solution is left implicit.