

Problem 31

The method outlined in Problem 30 can be used for any homogeneous equation. That is, the substitution $y = xv(x)$ transforms a homogeneous equation into a separable equation. The latter equation can be solved by direct integration, and then replacing v by y/x gives the solution to the original equation. In each of Problems 31 through 38:

- (a) Show that the given equation is homogeneous.
- (b) Solve the differential equation.
- (c) Draw a direction field and some integral curves. Are they symmetric with respect to the origin?

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