2-6

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In Problems 1–6 solve the given Bernoulli equation.

1

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

3

$$\frac{dy}{dx} = y(xy^3 - 1)$$

5

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

In Problems 7–10 solve the given differential equation subject to the indicated initial condition.

7

$$x^2\frac{dy}{dx} - 2xy = 3y^4, y(1) = \frac{1}{2}$$

9

$$xy(1+xy^2)\frac{dy}{dx} = 1, y(1) = 0$$

Answers:

1

$y^3 = 1 + cx^{-3}$

3

$y^{-3} = x + \frac{1}{3} + ce^{3x}$

5

$e^{x/y} = cx$

7

$y^{-3} = -\frac{9}{5}x^{-1} + \frac{59}{5}x^{-6}$

9

$x^{-1} = 2 - y^2 - e^{-y^2/2}, the equation is Bernoulli in the variable x.$