Math 3331

First Order ODEs

February 9, 2026

Example 1

$$\frac{dy}{dx} = \frac{x - y}{x}$$

- separable
- linear
- Bernoulli
- Homogeneous
- exact

Example 1

$$\frac{dy}{dx} = \frac{x - y}{x}$$

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- Homogeneous
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$$\frac{dy}{dx} = 1 - \frac{y}{x}$$

homogeneous

Example 1

$$\frac{dy}{dx} = \frac{x - y}{x}$$

- separable
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$$\frac{dy}{dx} = 1 - \frac{y}{x}$$

homogeneous

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

linear

Example 2

$$(x + 1)\frac{dy}{dx} = 10 - y$$

- separable
- linear
- Bernoulli
- Homogeneous
- exact

Example 2

$$(x+1)\frac{dy}{dx} = 10 - y$$

- separable
- linear
- Bernoulli
- Homogeneous
- exact

separable, linear

Example 3

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

- separable
- linear
- Bernoulli
- homogeneous
- exact

Example 3

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

- separable
- linear
- Bernoulli
- homogeneous
- exact

homogeneous

Example 4

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

- separable
- linear
- Bernoulli
- homogeneous
- exact

Example 4

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

- separable
- linear
- Bernoulli
- homogeneous
- exact

Bernoulli

Example 4

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

- separable
- linear
- Bernoulli
- homogeneous
- exact

Bernoulli

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

homogeneous

Example 5

$$\frac{dy}{dx} = -\frac{3y^2 + 2x}{6xy + 4y^2}$$

- separable
- linear
- Bernoulli
- homogeneous
- exact

Example 5

$$\frac{dy}{dx} = -\frac{3y^2 + 2x}{6xy + 4y^2}$$

- separable
- linear
- Bernoulli   exact
- homogeneous
- exact

Example 6

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

- separable
- linear
- Bernoulli
- homogeneous
- exact

Example 6

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

- separable
- linear
- Bernoulli
- homogeneous
- exact

Bernoulli

Example 7

$$(x + 1)\frac{dy}{dx} = y + 1$$

- separable
- linear
- Bernoulli
- homogeneous
- exact

Example 7

$$(x+1)\frac{dy}{dx} = y + 1$$

- separable
- linear
- Bernoulli
- homogeneous
- exact

separable, linear

Example 8

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

- separable
- linear
- Bernoulli
- homogeneous
- exact

Example 8

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

- separable
- linear
- Bernoulli
- homogeneous
- exact

linear

Example 9

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

- separable
- linear
- Bernoulli
- homogeneous
- exact

Example 9

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

- separable
- linear
- Bernoulli
- homogeneous
- exact

exact

Example 10

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

- separable
- linear
- Bernoulli
- homogeneous
- exact

Example 10

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

- separable
- linear
- Bernoulli
- homogeneous
- exact

homogeneous

Example 11

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

- separable
- linear
- Bernoulli
- homogeneous
- exact

Example 11

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

- separable
- linear
- Bernoulli
- homogeneous
- exact

linear

Example 12

$$(y - x)\frac{dy}{dx} = y + x$$

- separable
- linear
- Bernoulli
- homogeneous
- exact

Example 12

$$(y - x)\frac{dy}{dx} = y + x$$

- separable
- linear
- Bernoulli
- homogeneous
- exact

homogeneous, exact

Example 13

$$y^3 \frac{dy}{dx} + \frac{y^4}{2x} = x$$

- separable
- linear
- Bernoulli
- homogeneous
- exact

Example 13

$$y^3 \frac{dy}{dx} + \frac{y^4}{2x} = x$$

- separable
- linear
- Bernoulli
- homogeneous
- exact

Bernoulli

Example 14

$$\frac{dy}{dx} = \frac{y\,(x-y)}{x\,(x+y)}$$

- separable
- linear
- Bernoulli
- homogeneous
- exact

Example 14

$$\frac{dy}{dx} = \frac{y\,(x-y)}{x\,(x+y)}$$

- separable
- linear
- Bernoulli
- homogeneous
- exact

homogeneous

Example 15

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

- separable
- linear
- Bernoulli
- homogeneous
- exact

Example 15

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

- separable
- linear
- Bernoulli
- homogeneous
- exact

separable