

ODE

First Order ODE

Exact

1. $3y^2 ty' + y^3 = -2t$

2. $\frac{dy}{dx} = \frac{x - y + 1}{x + y - 3}$

3. $2x^3 yy' + 3x^2 y^2 + 7 = 0$

4. $(x^3 + y^3)dx + 3xy^2 dy = 0$

5. $(2x + y + 1)dx + (x + 2y + 3)dy = 0$

6. $(2x - y)dx + (y - x)dy = 0$

7. $(x^2 - y^2)dx - 2xy dy = 0$

8. $x^2 \sin(x) - \cos(x)y = \sin(x) \frac{dy}{dx}$

9. $(x + 2y)dx + (2x + 3y)dy = 0$

10. $(3x^2 + 4xy)dx + (2x^2 + 2y)dy = 0$

Answers

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Exact

$$1. y = 3\sqrt{\frac{c_1}{t} - t}$$

$$2. y = 3 - x + \sqrt{2x^2 - 4x + c_1 + 9}, y = 3 - x - \sqrt{2x^2 - 4x + c_1 + 9}$$

$$3. y = \frac{\sqrt{-7x + c_1}}{x\sqrt{x}}, y = -\frac{\sqrt{-7x + c_1}}{x\sqrt{x}}$$

$$4. y = 3\sqrt{-\frac{x^3}{4} + \frac{c_1}{x}}$$

$$5. y = \frac{-3 - x + \sqrt{-3x^2 + 2x + c_1 + 9}}{2}, y = \frac{-3 - x - \sqrt{-3x^2 + 2x + c_1 + 9}}{2}$$

$$6. y = x + \sqrt{-x^2 + c_1}, y = x - \sqrt{-x^2 + c_1}$$

$$7. y = \sqrt{\frac{x^2}{3} + \frac{c_1}{x}}, y = -\sqrt{\frac{x^2}{3} + \frac{c_1}{x}}$$

$$8. y = -\frac{x^2 \cos(x)}{\sin(x)} + \frac{2(x \sin(x) + \cos(x))}{\sin(x)} + \frac{c_1}{\sin(x)}$$

$$9. y = \frac{-2x + \sqrt{x^2 + c_1}}{3}, y = -\frac{2x + \sqrt{x^2 + c_1}}{3}$$

$$10. y = -x^2 + \sqrt{x^4 - x^3 + c_1}, y = -x^2 - \sqrt{x^4 - x^3 + c_1}$$