

## ODE

## First Order ODE

## Bernoulli

1.  $y' + y = y^2(\cos(x) - \sin(x))$

2.  $x^3 y' = x^2 y - y^3$

3.  $xy' + y^2 \ln(x) + y = 0$

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

5.  $x^2 \frac{d}{dx}y + y^2 = xy$

6.  $y' = y(xy^3 - 1)$

7.  $\frac{d}{dx}y = y - \frac{1}{2}xy^2$

8.  $xy^2 y' + 3x^3 = y^3$

9.  $xy^2 \frac{d}{dx}y = x^2 + y^3$

10.  $xy' + y + xy^2 = 0$

**Answers**

**ODE**

**First Order ODE**

**Bernoulli**

$$1. y = \frac{1}{-\sin(x) + c_1 e^x}$$

$$2. y = \frac{x}{\sqrt{2\ln(x) + c_1}}, y = -\frac{x}{\sqrt{2\ln(x) + c_1}}$$

$$3. y = \frac{1}{-\ln(x) - 1 + c_1 x}$$

$$4. y = \frac{\sqrt[3]{5} x^2}{\sqrt{-9x^5 + 49}}$$

$$5. y = \frac{x}{\ln(x) + c_1}$$

$$6. y = \sqrt[3]{\frac{3}{3x + 1 + 3c_1 e^{3x}}}$$

$$7. y = \frac{2e^x}{e^x x - e^x + c_1}$$

$$8. y = x \sqrt[3]{-9\ln(x) + c_1}$$

$$9. y = -\sqrt[3]{x^2} \sqrt[3]{3 - c_1 x}$$

$$10. y = \frac{1}{x(\ln(x) + c_1)}$$