1.一断为维护部 (J解)

■ Example 1

$$y = \frac{C}{x} + 2,0 < x < +\infty, \forall C.$$

$$\frac{\mathrm{d}y}{\mathrm{d}x} = \frac{1}{x}(2-y)$$

■ Example 2

$$y = (x+1) - \frac{1}{3}e^x$$

$$\frac{\mathrm{d}y}{\mathrm{d}x} = y - x, y(0) = \frac{2}{3}$$

2、一阶级性为程本频

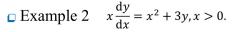
① 常数复多 法

□ Example 3

$$3xy' - y = \ln x + 1$$

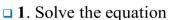


 \square Note The requirement x > 0 is superfluous.





Class Work



$$x\frac{\mathrm{d}y}{\mathrm{d}x} + 2y = x^2 + 1, x > 0$$

 \square satisfying y(1) = 1.

□ Answer:
$$y = \frac{1}{4}x^4 + \frac{1}{4x^2} + \frac{1}{2}$$

$$\Box \text{ Step 1 } x \frac{dy}{dx} + 2y = 0 \Rightarrow y = Cx^{-2}$$

□ Step 2

$$y = u(x)x^{-2} \Rightarrow u(x) = \frac{1}{4}x^4 + \frac{1}{2}x^2 + C$$

□ 2. Solve the equation

$$\frac{\mathrm{d}y}{\mathrm{d}x} + 3x^2y = x^2$$

 \square satisfying y(0) = -1.

□ Answer $y = \frac{1}{3} (1 - 4e^{-x^3})$



□ 3. Solve the equation $x \frac{dy}{dx} + 2y = 1 - \frac{1}{x}, x > 0$





- □ 3. Homogeneous Equations
- ☐ Chapter 9 Additional and Advanced Exercises: **5**

$$(x^2 + y^2)dx + xydy = 0$$

$$\frac{\mathrm{d}y}{\mathrm{d}x} = -\frac{x^2 + y^2}{xy} = -\frac{1 + \left(\frac{y}{x}\right)^2}{\frac{y}{x}}, xy$$

$$\neq 0$$