Felix

12.18

1

1.1

$$\frac{dy}{dx} = 4x$$

$y = y(x)$

$$y|_{x=1} = 3$$

1

$$y = 2x^2 + C$$

(2) $3 = 2 + C, \; C = 1,$

$$y = 2x^2 + 1$$

( ) ( )

1.2

1.2.1

$$\frac{dy}{dx} = f(x)g(y)$$

$g(y) \neq 0$ $f(x)g(x)$ ( )

$$\frac{dy}{g(y)} = f(x)dx$$

$y = y(x)$

$$\frac{y'(x)}{g(f(x))}dx = f(x)dx$$

$$\int \frac{dy}{g(y)} = \int f(x)dx$$

$$\frac{dy}{dx} = f\left(\frac{y}{x}\right)$$

$u = \frac{x}{y}$, $x = yu$

$$\frac{dy}{dx} = u + y\frac{du}{dx}$$

1.2.2

$$\frac{dy}{dx} = f\left(\frac{ax+by+c}{a_1x+b_1y+c_1}\right)$$

$c = c_1 = 0$ c c_1 0

$\frac{a_1}{a} = \frac{b_1}{b} = \lambda$, $a_1 = \lambda a$,$b_1 = \lambda b$, $u = ax + by$,

$$\frac{du}{dx} = a + b\frac{dy}{dx}$$

$$\frac{du}{dx} = a + bf\left(\frac{u+c}{\lambda u + c_1}\right)$$

$\frac{a_1}{a} \neq \frac{b_1}{b}$,

$$\begin{cases} ax+by+c \\ a_1x+b_1y+c \end{cases}$$

$x = x_0, y = y_0$ $\epsilon = x - x_0$,$\phi = y - y_0$,

$$\frac{dy}{dx} = \frac{d\phi}{d\epsilon}$$

$$[ax+by+c = a(\epsilon+x_0)+b(\phi+y_0)+c] = a\epsilon + b\phi$$
$$a_1x+b_1y+c_1 = a_1\epsilon + b_1\phi$$

$$\frac{dy}{dx} = f\left(\frac{a\epsilon+b\phi}{a_1\epsilon+b_1\phi}\right)$$

1.2.3

1.2.4

1.3

1.4

$$y^{(n)} + p_1(x)y^{n-1} + p_2(x)y^{(n-2)} + ... + p_n(x)y = f(x)$$

n

$f(x)$ 0 n n

n 0 k_1,k_2......k_n,

$$k_1 f_1(x) + k_2 f_2(x) + ... + k_n f_n(x) = 0$$

I I $k_i = 0$ I

$$f_n(x) = -\frac{k_1}{k_n} f_1(x) - \frac{k_2}{k_n} f_2(x) - ...... - \frac{k_{n-1}}{k_n} f_{n-1}(x)$$

$f_n(x)$ $n-1$

1.4.1

$$y'' + p(x)y' + q(x)y = 0$$

1

$y = y_1(x)$ $y = y_2(x)$ $y = y_1 + y_2$

2

$y = u(x) + iv(x)$ $y = u(x)$ $y = v(x)$

$y_1, y_2, ..., y_n$

$$y^{(n)} + p_1(x)y^{(n-1)} + ... + p_{n-1}(x)y' + p_n(x)y$$

n

$$y = C_1 y_1 + C_2 y_2 + ... + C_n y_n$$

$y_1, y_2, ..., y_n$

$$y'' + p(x)y' + q(x)y = f(x)$$

$$y'' + p(x)y' + q(x)y = 0$$

$y = y^{\cdot}(x)$ $y = y^{*}(x)$