

## Purpose of the questions

International Master's Programs of Chemical Engineering in the Graduate School of Engineering,  
Kyushu University (Academic Year from October, 2025)

Subject : Mathematics (1 sheet)

1.

$$(1.1) \quad y'' - 2y' - 3y = 0$$

$$y = C_1 e^{3x} + C_2 e^{-x}$$

$$(1.2) \quad y'' + 4y = \cos(2x)$$

$$y = C_1 \cos(2x) + C_2 \sin(2x) + \frac{x}{4} \sin(2x)$$

$$(1.3) \quad y''' - 3y'' + 4y = 0$$

$$y = C_1 e^{-x} + (C_2 + C_3 x) e^{2x}$$

$$(1.4) \quad y''' - 3y'' + 4y = 5x + 8e^{3x}$$

$$y = \frac{5}{4}x + 2e^{3x} + C_1 e^{-x} + (C_2 + C_3 x) e^{2x}$$

2.

$$(2.1)$$

$$(a + b)$$

$$(2.2)$$

$$\pi \left( \frac{\pi}{2} - 1 \right)$$