Example Answers

International Master's Programs of Chemical Engineering in the Graduate School of Engineering, Kyushu University (Academic Year from April, 2026)

科　目／Subject：数学／Math（1 枚/ 1 sheet）

1. (17 点／17 points)

(1.1) $N\ln N - N + 1$

(1.2) $2x\sin x + (2 - x^2)\cos x + \text{const.}$

2. (17 点／17 points)

(2.1) $-\frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + O(x^5)$

(2.2) $-\frac{1}{2}$

3. (16 点／16 points)

(3.1) $\boldsymbol{X} = \begin{bmatrix} 2 & 7 \\ 1 & 4 \end{bmatrix}^{-1} \begin{bmatrix} 3 & -2 & 0 \\ 1 & -4 & -1 \end{bmatrix} = \frac{1}{8-7} \begin{bmatrix} 4 & -7 \\ -1 & 2 \end{bmatrix} \begin{bmatrix} 3 & -2 & 0 \\ 1 & -4 & -1 \end{bmatrix} = \begin{bmatrix} 5 & 20 & 7 \\ -1 & -6 & -2 \end{bmatrix}$

(3.2) $X = \begin{bmatrix} -8 & 3 & 0 \\ -5 & 9 & 0 \end{bmatrix} \begin{bmatrix} 5 & 3 & 1 \\ 1 & -3 & -2 \\ -5 & 2 & 1 \end{bmatrix}^{-1} = \begin{bmatrix} -8 & 3 & 0 \\ -5 & 9 & 0 \end{bmatrix} \frac{1}{19} \begin{bmatrix} 1 & -1 & -3 \\ 9 & 10 & 11 \\ -13 & -25 & -18 \end{bmatrix} = \frac{1}{19} \begin{bmatrix} 19 & 38 & 57 \\ 76 & 95 & 114 \end{bmatrix}$

$= \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$