

**Written Examination**  
**Graduate School of Marine Science and Technology**  
**Course of Maritime Technology and Logistics**  
**Basic Subject    Maritime Technology and Logistics**

February 3, 2026

- ※ Write answers in English on answer sheet and continue overleaf if necessary.
- ※ Write answers in English
- ※ Questions are on Page 1, next.

Use answer sheets ①,②,③,④  
for problems I, II, III, IV, respectively.

I Consider the matrix  $A = \begin{pmatrix} 5 & 0 & -6 \\ -9 & -1 & 9 \\ 3 & 0 & -4 \end{pmatrix}$ .

(1) Find the eigenvalues and the eigenvectors of  $A$ .

(2) Find a nonsingular matrix  $P$  and a diagonal matrix  $B$  such that  $B = P^{-1}AP$ .

II Find the extremal values of  $f(x, y) = -y^3 + x^2 + xy - y^2 - x$ .

III

(1) Find the following integral.

$$\int \frac{x^2 + 3x + 1}{x^3 + x^2 - 2} dx$$

(2) Evaluate the following integral.

$$\iint_D \frac{1}{1+x+y} dx dy, \quad D = \{(x, y) \mid 0 \leq x \leq 1, \quad 0 \leq y \leq x\}$$

IV Find the general solutions to the following differential equations.

(1)  $y' = 3xy\sqrt{1-x^2}$

(2)  $3y'' - y' - 2y = (x+1)e^{-x}$

# Answer Sheet

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Course	Course of Maritime Technology and Logistics	Applicant's number	
Name of Basic Subject	Maritime Technology and Logistics	Name	

※Write answers in English on this page and continue overleaf if necessary.

①

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④

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# Scratch paper

(This form will be collected after the test.)

(This form is not evaluated.)

Applicant's number

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Name

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