口 述 試 験（午 前 1）　　２１　大修

工 学 基 礎　　時間　９：００～１０：００

Answers to questions can be given in Japanese or English.

1. Obtain the general solution of the ordinary differential equation,

$$\frac{d^2y}{dx^2}-\frac{3}{2x}\frac{dy}{dx}=0, \tag{1}$$

by reducing to a first order equation.

2. Solve the ordinary differential equation,

$$x\frac{dy}{dx}-3y=k, \qquad (k \text{ is a constant}) \tag{2}$$

by assuming a solution in the form of a *power series* with unknown coefficients a_m,

$$y=\sum_{m=0}^{\infty}a_m x^m . \tag{3}$$

3. Find the eigenvalues (固有値) and normalized eigenvectors (正規化された固有ベクトル) of the matrix,

$$\mathbf{A}=\begin{bmatrix}6 & 4 & 0\\ 4 & 6 & 0\\ 0 & 0 & -2\end{bmatrix}. \tag{4}$$