

## 平成27年度 数学

$$\square (1) I_n = \frac{n-1}{n} I_{n-2}$$

$$(2) \frac{5\pi}{32}$$

$$\square (1) \text{固有値: } \lambda = 2, 3 \quad \text{固有ベクトル } p_1 = \begin{pmatrix} 2 \\ 1 \end{pmatrix}, p_2 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

$$(2) P^{-1}AP = \begin{bmatrix} 2 & 0 \\ 0 & 3 \end{bmatrix} \quad A^n = \begin{bmatrix} 2 \cdot 2^n - 3^n & -2 \cdot 2^n + 2 \cdot 3^n \\ 2^n - 3^n & -2^n + 2 \cdot 3^n \end{bmatrix}$$

$$(3) A + A^2 + \dots + A^{n-2} + A^{n-1} = \frac{1}{2} \begin{bmatrix} -5 + 4 \cdot 2^n - 3^n & 2 - 4 \cdot 2^n + 2 \cdot 3^n \\ -1 + 2 \cdot 2^n - 3^n & -2 \cdot 2^n + 2 \cdot 3^n \end{bmatrix}$$

$$\square (1) (i) \frac{dy}{dx} + y = 0, y = Ce^{-x} \quad (ii) y = x - 1 + Ce^{-x}$$

$$(2) x = C_1 e^{3x} + C_2 e^{-x} \quad y = -3C_1 e^{3x} + C_2 e^{-x}$$

$$\square (1) a_0 = \frac{2}{3}\pi^2 \quad a_n = \frac{4}{n^2}(-1)^n \quad b_n = 0$$

$$(2) S(x) = \frac{\pi^2}{3} + 4 \sum_{n=1}^{\infty} \frac{1}{n^2} (-1)^n \cos nx$$

$$(3) \sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{\pi^2}{6}$$