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第 1 至第 6 題;試求解起始值問題之解 y :
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1. $\frac{dy}{dx} = ye^{-3x}$; $y(0) = 1$. (10%)

2. $\frac{dy}{dx} = \frac{y^2 + 1}{y(x^2 - 1)}$; $y(0) = 1$. (10%)

3. $\frac{dy}{dx} = \frac{-2}{x}y + e^{2x}$; $y(1) = 0$. (10%)

4. $\frac{d^2y}{dx^2} + 5\frac{dy}{dx} + 6y = x^2$; $y(0) = 0$, $\frac{dy(0)}{dx} = 0$. (10%)
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5. $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = e^x$; $y(0) = 0$, $\frac{dy(0)}{dx} = 1$. (10%)
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6. $\frac{d^2y}{dx^2} + 4y = \frac{1}{\cos 2x}$; $y(0) = 0$, $\frac{dy(0)}{dx} = 0$. (10%)

矩陣 $A = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 \\ 1 & 0 & 0 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 5 & 2 & 0 & 0 \\ 0 & 6 & 3 & 1 \\ 0 & 0 & 7 & 4 \end{bmatrix}$, $C = \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}$, $D = \begin{bmatrix} 1 & 2 \\ 3 & 0 \end{bmatrix}$, $X = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix}$.

7. 試求行列式 $\det(B)$ 之值. (10%)

8. 試求矩陣 A 的反矩陣 A^{-1} . (10%)

9. $AX = C$, 試求未知矩陣 X 之值. (10%)
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10. 試求矩陣 D 的特徵值(characteristic values)與對應的特徵向量
(characteristic vectors). (10%)
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