

臺灣綜合大學系統

106 學年度

轉學生聯合招生考試

# 試 題

類組：D09

科目名稱：工程數學

科目代碼：D0992

臺灣綜合大學系統 106 學年度學士班轉學生聯合招生考試試題

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※本項考試依簡章規定各考科均「不可以」使用計算機

本科試題共計 一 頁

1. Solve the following differential equations.

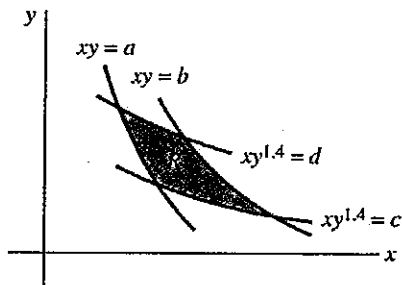
(a)  $x^3y' - x^2y + y^2 = 0$  (10%)

(b)  $y'' + y = \sec x$  (10%)

(c)  $(e^{2y} - y \cos xy)dx + (2xe^{2y} - x \cos xy + 2y)dy = 0$  (10%)

2. Solve the integral equation  $f(t) + 2\int_0^t f(\tau) \cos(t-\tau)d\tau = 4e^{-t} + \sin t$ . (20%)

3. Find the area of region  $R$ , where  $R$  is the region bounded by  $xy = a$ ,  $xy = b$ ,  $xy^{1.4} = c$  and  $xy^{1.4} = d$ . (20%)



4. Find an orthogonal matrix  $\mathbf{P} = ?$  that diagonalizes  $\mathbf{A} = \begin{bmatrix} 1 & 0 & 7 \\ 0 & 1 & 0 \\ 7 & 0 & 1 \end{bmatrix}$  and the diagonal matrix  $\mathbf{D} = ?$

such that  $\mathbf{D} = \mathbf{P}^T \mathbf{A} \mathbf{P}$ . (20%)

5. Find the directional derivative of  $f(x, y, z) = \frac{x^2 - y^2}{z^2}$  at point  $(2, 4, -1)$  in the direction  $\mathbf{i} - 2\mathbf{j} + \mathbf{k}$ . (10%)