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

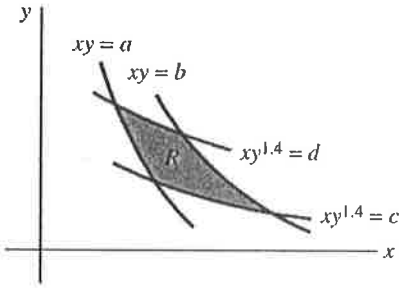
科目名稱	工程數學	類組代碼	D09
		科目碼	D0992

※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 $\mathbf{D} = \mathbf{P}^T\mathbf{AP}$. (20%)

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