

臺灣綜合大學系統 109 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	D37
		科目碼	D3792

※本項考試依簡章規定所有考科均「不可」使用計算機。 本科試題共計 / 頁

1. Solve the initial-value problem $x^2 y'' - 5xy' + 8y = 8x^6$, $y(1) = 2$, $y'(1) = 6$. (25%)

2. Use the power series $y = \sum_{n=0}^{\infty} c_n x^n$ to find the general solution of $(x-1)y'' + y' = 0$. (25%)

3. Verify the divergence theorem $\iint_S (\mathbf{F} \cdot \mathbf{n}) dS = \iiint_D \text{div} \mathbf{F} dV$ for the vector field

$\mathbf{F} = 6xy \mathbf{i} + 4yz \mathbf{j} + xe^{-y} \mathbf{k}$, where D is the region bounded by the three coordinate planes and the plane $x + y + z = 1$. (25%)

4. Find the general solution of the system of differential equations,

$$\begin{pmatrix} x'(t) \\ y'(t) \\ z'(t) \end{pmatrix} = \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 1 \end{pmatrix} \begin{pmatrix} x(t) \\ y(t) \\ z(t) \end{pmatrix},$$

by using the associated eigenvalues and eigenvectors. (25%)