臺灣綜合大學系統108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各考科均「不可以」使用計算機　　本科試題共計 / 頁

1. Solve the initial-value problem $y''-4y'+4y=(12x^2-6x)e^{2x}$, $y(0)=1$, $y'(0)=0$ by variation of parameters. **(25%)**

2. Use the Laplace transform to solve the initial-value problem:

$$\begin{cases} \dfrac{d^2x}{dt^2}+\dfrac{dx}{dt}+\dfrac{dy}{dt}=0 \\ \dfrac{d^2y}{dt^2}+\dfrac{dy}{dt}-4\dfrac{dx}{dt}=0 \end{cases} \quad \text{subject to} \quad \begin{cases} x(0)=1,\ x'(0)=0 \\ y(0)=-1,\ y'(0)=5 \end{cases}. \qquad \textbf{(25\%)}$$

3. Find the matrix $\mathbf{X}$ to satisfy the equation $\mathbf{X}^2-5\mathbf{X}+6\mathbf{I}=\begin{pmatrix} -4 & -5 \\ 8 & 10 \end{pmatrix}$. **(25%)**

4. Verify Stokes' theorem $\oint_C \mathbf{F}\cdot d\mathbf{r}=\iint_S (\operatorname{curl}\mathbf{F})\cdot\mathbf{n}\,dS$ for the vector field $\mathbf{F}=5y\,\mathbf{i}-5x\,\mathbf{j}+3\,\mathbf{k}$, and for S being the portion of the plane $z=1$ within the cylinder $x^2+y^2=4$. Assume S is oriented upward. **(25%)**