淡江大學九十二學年度碩士班招生考試試題

系別：土木工程學系　　科目：工 程 數 學

准帶項目請打「○」否則打「×」
簡單型計算機 ×

本試題共 1 頁

1. Solve the following equation: (20%)

   1) $1+(3x-e^{-2y})y'=0$

   2) $y'+\frac{1}{x}y=3x^2y^3$

   3) $\cos x\,(e^{2y}-y)\frac{dy}{dx}=e^{y}\sin 2x\,,\ y(0)=0$

   4) $y''-4y'+4y=0\,,\ y(0)=3,\ y'(0)=1$

2. Solve $y'+y=f(t)$ by Laplace Transform (20%)

   where $y(0)=5\,,\ f(t)=\begin{cases}0 & 0\le t<\pi\\ 3\sin(t) & t>\pi\end{cases}$

3. Find the eigenvalues of the matrix B and, for each eigenvalue, a corresponding eigenvector. Also check that eigenvectors associated with distinct eigenvalues are orthogonal. (20%)

$$B=\begin{bmatrix}0 & 1 & 0\\ 1 & -2 & 0\\ 0 & 0 & 3\end{bmatrix}$$

4. Use the Green's theorem to calculate $\oint_C F\cdot dR$. The curve is oriented counterclockwise.
   Where **F** = $2y$ **i** - x **j**, and C the circle of radius 4 about (1, 3). (20%)

5. Evaluate $\iint_\Sigma z\,d\sigma$, with Σ the part of the plane $x+y+z=4$ lying above the rectangle $0\le x\le 2,\ 0\le y\le 1$. (20%)