淡江大學 97 學年度碩士班招生考試試題

系別：機械與機電工程學系　　科目：工 程 數 學

准帶項目請打「V」
簡單型計算機

本試題共 (空) 頁，五 大題

1. (15%) Solve $xy' = \frac{y^2}{x} + y$.

2. (20%) Find the general solution of the differential equation.
$y'' - 3y' + 2y = 10\sin(x)$

3. (20%) Use the Laplace transform to solve the initial value problem.
$y'' + 2y' + 2y = \delta(t-4);\ \ y(0) = y'(0) = 0$

4. (20%) Solve the partial differential problem.
$\frac{\partial u^2}{\partial x^2} + \frac{\partial u^2}{\partial y^2} = 0 \quad (x > 0, y < 0)$,
$u(x,0) = 0 \qquad (x > 0)$,
$u(0,y) = \begin{cases} 0, & \begin{cases} -5 \le y \le 0 \\ y < -7 \end{cases} \\ 2, & -7 \le y < -5 \end{cases}$.

5. (25%) Evaluate both sides of Stokes's Theorem,
$\oint_C \vec{v} \bullet d\vec{R} = \int_S \vec{n} \bullet \nabla \times \vec{v}\, d\sigma$,
where $\vec{v} = 2\vec{i} + yz^2\vec{j} + x\vec{k}$ and S is the plane with corners at (1,0,0), (0,2,0), (0,0,1) as shown, and verify that the results do agree.