

淡江大學九十學年度碩士班招生考試試題

系別：水資源及環境工程學系

科目：工程數學

准帶項目請打「○」否則打「x」	
計算機	字典
X	X

本試題共 () 頁

1. Using the method of separation of Variables to solve PDE.

$$U_t = a^2 U_{xx}$$

$$\text{B.C. } \begin{cases} U_x(0, t) = 0 \\ U_x(L, t) = 0 \end{cases}$$

$$\text{I.C. } U(x, 0) = h(x) \quad (25\%)$$

$$2. \begin{cases} \frac{dx}{dt} = 10x \\ \frac{dy}{dt} = x - 3y - 4z \\ \frac{dz}{dt} = 2y + 6z \end{cases}$$

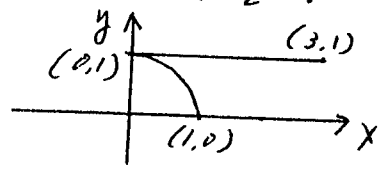
$$x(0) = 1, \quad y(0) = -1, \quad z(0) = 2$$

Compute $x(t)$, $y(t)$, and $z(t)$ (25%)

3. Evaluate $\iint_S \left(\frac{xy}{z}\right) d\sigma$

S : the part of the paraboloid $z = x^2 + y^2$ lying the first octant for $4 \leq x^2 + y^2 \leq 9$ (25%)

4. Let C be the curve consisting of the quarter-circle $x^2 + y^2 = 1$ in the x, y -plane from $(1, 0)$ to $(0, 1)$, then the horizontal line segment from $(0, 1)$ to $(3, 1)$, Let $\vec{F}(x, y) = 4x\vec{i}$. Compute $\int_C \vec{F} \cdot d\vec{R}$



(25%)