

長庚大學九十七學年度研究所碩士班(含在職專班)招生考試試題

所別：醫學物理暨影像科學所碩士班

考試科目：應用數學

注意：請詳細閱讀下列試題，並請標明題號依試題順序將答案書寫於答案卷上。

(計算題，共七題，共一百分，共一頁)

$$u_{xx} - u_t = 0$$

$$u(0, t) = 0$$

1. Please solve the PDE $u(L, t) = 100$ (20pts)

$$u(x, 0) = 100$$

$$(0 < x < L, 0 < t < \infty)$$

2. Please calculate $\int_0^{\infty} \frac{\sin x^2}{x} dx$ (15 pts)

3. Let $\phi(x, y, z) = 3x^2y - 5y^2z$, please find the divergence, gradient, and curl at $(1, -2, -1)$ (12pts)

4. Please solve $y' = \frac{1-2y-4x}{1+y+2x}$ (14 pts)

5. Please solve $y(t) = \sin 2t + \int_0^t y(\tau) \sin 2(t-\tau) d\tau$ (10 pts)

6. Please diagonalize $\begin{bmatrix} 2 & 1 & -1 \\ 1 & 4 & 3 \\ -1 & 3 & 4 \end{bmatrix}$ (15 pts)

7. Please show that the volume of a right circular cone is $V = \frac{\pi h^3}{3} \tan^2 \theta$ by using volume integration in **both** cylindrical- and spherical- coordinate. (14 pts)

