國立彰化師範大學 97 學年度碩士班招生考試試題

系所：統計資訊研究所碩士班　　科目：基礎數學(微積分、線性代數)

☆☆請在答案紙上作答☆☆　　

Part I. Linear Algebra (60%)

1. Find the Jordan form J of the matrix A below together with a non-singular matrix P such that $P^{-1}AP = J$.

$$A=\begin{bmatrix} 3 & 0 & 1 \\ -4 & 1 & -2 \\ -4 & 0 & -1 \end{bmatrix}$$ (20%)

2. Find the matrix of the linear transformation $T(x_1, x_2, x_3) = (4x_1 + x_2 - x_3, x_1 + 3x_3, x_2 + 2x_3)^T$ with respect to the basis $(1, 1, 1)^T, (1, 0, 1)^T, (0, 1, 1)^T$. (20%)

3. Find an orthonormal basis for the plane $x - 2y + 3z = 0$ in R^3. (20%)

Part II. Calculus (40%)

4. Let f be a function such that f' is continuous on $[a, b]$. Show that

$$\int_a^b f(t)f'(t)dt = \frac{1}{2}[f^2(b) - f^2(a)].$$ (20%)

5. Find H'(2) given that

$$H(x) = \int_{2x}^{x^3-4} \frac{x}{1+\sqrt{t}}\,dt$$ (20%)