國立中央大學 106 學年度碩士班考試入學試題

所別: 電機工程學系碩士班 電波組(一般生)

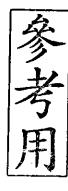
共 頁 第 頁

科目: 工程數學(不含複變)

本科考試禁用計算器

*請在答案卷

須有計算過程



- 1. (20%) Find the quadratic polynomial p(x) that gives the best squares fit to the following data (x, y): (0, 3), (1,2), (2, 4), (3,4).
- 2. (20%) Let $L: R^2 \rightarrow R^3$ be the linear transformation defined by $L(\mathbf{x}) = [x_2, (x_1 + x_2), (x_1 x_2)]^T$ Find the matrix representation A of L with respect to the ordered bases $\{\mathbf{u}_1, \mathbf{u}_2\}$ and $\{\mathbf{b}_1, \mathbf{b}_2, \mathbf{b}_3\}$, where $\mathbf{u}_1 = [1, 2]^T$, $\mathbf{u}_2 = [3, 1]^T$, and $\mathbf{b}_1 = [1, 0, 0]^T$, $\mathbf{b}_2 = [2, 1, 0]^T$, $\mathbf{b}_3 = [1, 2, 1]^T$.
- 3. (20%) Find the Laplace transform of the following function:

$$f(t) = k \sin\left(\frac{t}{2}\right) \quad (0 < t < 2\pi)$$

4. (20%) Solve the following differential equation:

$$y'-1=e^{-y}\sin x$$

5. (20%) For a continuous-time non-periodic signal x(t), the signals is

$$x(t) = t \cdot e^{j\omega_0 t} \cdot e^{-at} u(t).$$

Please find its Fourier transform $X(j\omega)$.