系所組別： 工程科學系乙組

考試科目： 數值分析

考試日期：0225，節次：1

1. Explain what are round-off error and truncation error in numerical methods. (10%)

2. Determine a polynomial p(x) of degree at most 2 such that p(-1) = 1, p(0) = 0, and p(1) = 1. (10%)

3. Let $A = \begin{pmatrix} 1 & 2 \\ 2 & 5 \end{pmatrix}$

   Compute the LU factorization of A without pivoting. (25%)

4. Suppose that the Newton-Raphson method was applied to determine an approximate root of the polynomial $x^3 + 3x^2 - 3$, taking 0.5 as the initial guess, what is the fourth iteration? (30%)

5. The Gaussian quadrature gives the following formula

   $$\int_{-1}^{1} f(x)dx = C_0 f(x_0) + C_1 f(x_1)$$

   Describe how to determine the corresponding coefficients. (25%)