考試科目	微積分	系所別	國際經營與貿易	考試時間	2月18日(一)第三節

Show your calculation to receive full credit.

1. (30 points) Evaluate the following limits:

$$\text{(a) } \lim_{x\to 0}\frac{\sin x}{x} \qquad \text{(b) } \lim_{x\to 0+}\frac{\sin x}{x^2}$$

2. (30 points) Evaluate the following integrals:

$$\text{(a) } \int_0^{\infty} x^2 e^{-x^2}dx \qquad \text{(b) } \int_1^{n} \log x dx$$

3. (20 points) Suppose a amount of NT$100 is deposited in SuperBank which pays an annual interest rate of 100%. Find the value of the account at end of the year if
   (a) the interest is compounded monthly
   (b) the interest is compounded continuously

4. (20 points) Let $g(\boldsymbol{\beta}) = \|\boldsymbol{y} - X\boldsymbol{\beta}\|^2 + 0.5\|\boldsymbol{\beta}\|^2$, where X is an $n \times p$ matrix whose ith row is $\boldsymbol{x}_i = (x_{i1}, ..., x_{ip})$,

$$\boldsymbol{y} = \begin{bmatrix} y_1 \\ \vdots \\ y_n \end{bmatrix} \quad \text{and} \quad \boldsymbol{\beta} = \begin{bmatrix} \beta_1 \\ \vdots \\ \beta_p \end{bmatrix}.$$

The notation $\|\cdot\|^2$ represents the Euclidean norm; that is, for any $\boldsymbol{a} = (a_1, ..., a_p)$ in R^p, $\|\boldsymbol{a}\|^2 := \sum_{i=1}^{p} a_i^2$. Assume that X and $\boldsymbol{y}$ are known. Find $\boldsymbol{\beta}$ that minimizes g.

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。