考試科目	微積分	系所別	企業管理研究所乙組	考試時間	2月10日(四)第四節

請詳述解題過程，無過程者不予計分。

(1) Either find the limit or explain why it does not exist.

(a) **(5 points)** $\lim_{x\to 0^+} x^3 \sin(\frac{1}{x})$

(b) **(5 points)** $\lim_{x\to 0} \frac{x}{|x|}$

(2) Evaluate the integral.

(a) **(15 points)** $\int_0^1 \frac{x}{\sqrt{1+2x}} dx$

(b) **(15 points)** $\int_{-\infty}^{\infty} x^2 e^{-x^2/2} dx$

(3) Determine whether each of the following series is convergent or divergent

(a) **(10 points)** $\sum_{n=3}^{\infty} \frac{\ln(n)}{n^2}$

(b) **(10 points)** $\sum_{n=1}^{\infty} \frac{(-3)^n}{n!}$

(4) Let $f(x) = \left| e^{(x-1)^3+1} - 1 \right|$.

(a) **(5 points)** Find all relative maxima and relative minima of $f(x)$.

(b) **(10 points)** Is $(1, e-1)$ an infection point of $f(x)$? Justify your answer.

(c) **(10 points)** Find the horizontal asymptote of the graph of $f(x)$.

(5) **(15 points)** Evaluate the integral $\iint_{\Omega} (\frac{1}{2} xy^2) dA$ where Ω is the region bounded by the line $y = x - 1$ and the parabola $y^2 = 2x + 6$ (i.e. $\Omega = \{(x, y) \mid y \geq x - 1$ and $2x + 6 \geq y^2\}$).

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。