

科目：微積分

系所組：統計資訊系 應用統計碩士班

一. 計算下列各題：(64 %)

(a) $\lim_{x \rightarrow 0} \frac{\sin x - x}{e^x - e^{-x} - 2x}$

(b) Find $f'(e)$ if $f(x) = \frac{3 \ln(\sqrt{x})}{x^2}$.

(c) Find $f'(1)$ if $f(x) = \int_{x^4}^2 \frac{t}{\sqrt{t^3 + 3}} dt$.

(d) Find $\frac{dy}{dx}$ at $(1, 2)$ if $4xy^3 - x^2y + x^3 - 5x - 26 = 0$.

(e) $\int \frac{e^{\sqrt{3x}}}{\sqrt{2x}} dx$

(f) $\int 2x(\ln x)^2 dx$

(g) $\int_0^{\infty} e^{-3x^2} dx$

(h) Find $\iint_R x e^{y^3} dA$, where R is bounded by $y = x/2$, $y = 1$ and $x = 0$.

二. The demand for motorcycle tires imported by Dixie Import-Export is 40000/year and may be assumed to be uniform throughout the year. The cost of ordering a shipment of tires is \$400, and the cost of storing each tire for a year is \$2. Determine how many tires should be in each shipment if the ordering and storage costs are to be minimized. (12 %)

三. Tracy purchased a 10-year franchise for a computer outlet store that is expected to generate income at the rate of $f(t) = 50000 + 2000t$ dollars/year. Find the present value of the franchise if the prevailing interest rate is 5%/year compounded continuously. (12 %)

四. (a) Find the Maclaurin series for $e^{-\frac{1}{2}x^2}$. (b) Approximate $\int_0^1 e^{-\frac{1}{2}x^2} dx$ to four decimal places. (12 %)

※ 注意：1. 考生須在「彌封答案卷」上作答。

2. 本試題紙空白部份可當稿紙使用。

3. 考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。