國立中興大學97學年度碩士班招生考試試題

科　目：微積分　　所　別：財務金融學系甲組

本科目試題共1頁

本科目不能使用計算機

第一部份、填充題（不需計算過程）：每格6分，共60分，
請以 (A), (B), (C), ….依序標示清楚。

1. Find $\iint_R \cos(x-y)\sin(x+y)dxdy =$ **(A)**, where R is the triangle with vertices (0, 0), (π, $-\pi$), and (π, π).
2. Find $\int \frac{1}{\sqrt{1-6x-x^2}}dx =$ **(B)**.
3. Find the minimum distance **(C)** between the origin and the surface $z^2 = x^2y+4$.
4. For what values **(D)** of p does the integral $\int_0^1 \frac{1}{x^p}dx$ diverge?
5. Find the first three nonzero terms **(E)** of the Maclaurin series for $\frac{1}{1+\sin x}$.
6. Find $\lim_{x\to\pi/2}(\sin x)^{\tan x} =$ **(F)**.
7. Find the length **(G)** of $y = \int_{\pi/6}^{x}\sqrt{64\sin^2 u\cos^4 u - 1}du$, $\frac{\pi}{6}\le x\le\frac{\pi}{3}$.
8. Find $f(x) =$ **(H)** if $\int_0^{x^2} f(t)dt = \frac{1}{3}x^3$.
9. Find the equation **(I)** of the normal line (line perpendicular to the tangent line) to the curve $8(x^2+y^2)^2 = 100(x^2-y^2)$ at (3, 1).
10. The Mean Value Theorem for Derivatives says that if f is continuous on $[a, b]$ and differentiable on (a, b), then there is a point c in (a, b) such that **(J)**.

第二部份、計算題（需詳細計算過程，否則不予計分），
每題10分，共40分

1. A cylindrical can (圓柱筒) is to be made to hold 1L of oil. Find the dimensions that will minimize the cost of the metal to manufacture the can.
2. Find the volume of a pyramid (金字塔) whose base is a square with side L and whose height is h.
3. For what values of x is the series $\sum_{n=0}^{\infty}\frac{(-1)^n x^{2n}}{2^{2n}(n!)^2}$ convergent?
4. Sketch the graph of $y = f(x) = \frac{2x^2}{x^2-1}$.