

靜宜大學 97 學年度碩士班招生考試試題

系所：應用數學系

科目：微積分

共 1 頁

1. (10%) If h is the inverse function of $f(x) = x + 3x^3 + x^5 + e^x$, find $h'(1)$.
(Hint: $f(0) = 1$.)
2. (10%) Find the minimum of $f(x, y, z) = 3x + 2y + z + 3$ subject to the constraint $g(x, y, z) = 9x^2 + 4y^2 - z = 0$.
3. Find the following limits:
 - (a) (5%) $\lim_{x \rightarrow 0} x \sin \frac{1}{x}$
 - (b) (5%) $\lim_{x \rightarrow 0} \sin \frac{1}{x}$
 - (c) (5%) $\lim_{x \rightarrow 2} x^2 + x$
 - (d) (5%) $\lim_{x \rightarrow 0^+} \frac{x^3}{\cos x - x}$
4. Find the following integrals
 - (a) (10%) $\int e^{2x} \sin 3x dx$
 - (b) (10%) $\int_0^2 \frac{1}{(2x-1)^{\frac{4}{3}}} dx$
5. Find the interval of convergence of the following series
 - (a) (10%) $\sum_{n=1}^{\infty} \frac{(-2x)^n}{3^{n+1}(n+3)}$
 - (b) (10%) $\sum_{n=1}^{\infty} \frac{(x+1)^n}{4^{n+1}(n+2)}$
6. (10%) Find the Maclaurin series of the function $f(x) = e^{x^2}$.
7. (10%) Find the area of the surface $z = x^2 + y^2$ below the plane $z = 9$.