

國立臺北大學 109 學年度碩士班一般入學考試試題

系(所)組別：財政學系
科 目：微積分

第1頁 共1頁
可 不可 使用計算機

- (10%) Find the limits: (a) $\lim_{x \rightarrow 1} \frac{x^{50} - 1}{x - 1}$. (b) $\lim_{x \rightarrow \infty} \frac{x + \sin x + 2\sqrt{x}}{x + \sin x}$.
- (10%) Find $h'(0)$ if $h(x) = \left[\frac{g(x) - x}{3 + g(x)} \right]^2$, where $g(0) = 3$ and $g'(0) = -2$.
- (10%) Find dy/dx for the equation $xy^3 + (2y)^2 - 5y = \frac{(x^2 - 9)}{\sqrt{x^2 + 2}}$.
- (20%) Analyze and sketch the graph of $f(x) = \frac{2(x^2 - 9)}{x^2 - 4}$. (Label the intercepts, the coordinates of any local and absolute extreme points, inflection points, and asymptotes if any.)
- (10%) $\int_1^2 (\ln(x + 1))^2 dx$.
- (10%) Set up the integral $\int_R \int \frac{y}{1 + x^2} dA$ for both orders of integration and use the more convenient order to evaluate the integral over the region R bounded by $y = 0, y = \sqrt{x}, x = 4$.
- (10%) Determine the convergence or divergence:
(a) $\sum_{n=1}^{\infty} \frac{4^n}{3^n + 1}$, (b) $\frac{1}{1} - \frac{2}{1} + \frac{4}{2} - \frac{8}{6} + \frac{16}{24} - \dots$
- (10%) Find the Taylor series generated by $f(x) = 2^x$ at $a = 1$.
- (10%) Assume that $w = f(s^3 + t^2)$ and $f'(x) = e^x$. Find $\frac{\partial w}{\partial t}$ and $\frac{\partial w}{\partial s}$.

試題隨卷繳交