國立政治大學九十 八 學年度研究所(博/碩) 士班入學考試命題紙

考試科目	微積分	所別	財政學系	考試時間	3 月 15 日 星期 日 第 4 節

每小題 10%，共 100%

1. Show that $f(x) = x^2$ is continuous everywhere.
2. Evaluate the derivatives $\frac{dy}{dx}$:
   (a) Let $y = (1-x)^x$.
   (b) $x^2 + 2xy + y^2 = 3$.
3. Calculate the approximate value of $\sqrt[3]{999}$ by using the total differential.
4. Define $f(x) = \int_1^x \frac{1}{t} dt$ for any $x > 0$. Let $g(x)$ be the inverse of $f(x)$ such that $f(g(x)) = x$ for all x. Show that $g'(x) = g(x)$ for all x.
5. Find the relative maximum value(s) of $f(x) = \int_{-3}^x (t^2 + 2t)dt - 3x$.
6. Evaluate the integral $\int x^2(1-x)^{89} dx$.
7. Evaluate the definite integral $\int_{-1}^2 |x|[[x]]dx$ where $[[x]]$ denotes the Gaussian function, that is the largest integer that is less than or equal to x.
8. Solve the differential equation $\frac{dy}{dx} = (1+y)(2+x)$ with $y = 2$ when $x = 0$.
9. Find all values of x for which the series $\sum_{n=1}^{\infty} \frac{(x-1)^n}{5^n}$ converges.
10. Find the area of the region enclosed by the curves $y = x$, and $y = \sqrt[3]{x}$.

備考	試題隨卷繳交
命題委員：	

命題紙使用說明：1. 試題將用原件印製，敬請使用黑色墨水正楷書寫或打字（紅色不能製版請勿使用）。
2. 書寫時請勿超出格外，以免印製不清。
3. 試題由郵寄遞者請以掛號寄出，以免遺失而示慎重。