

國立臺北大學 110 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

注意事項：(1) 請按題號順序作答，並註明題號。(2) 可用鉛筆。(3) 不可使用計算機。(4) 每題皆需要計算過程。

1. (10%) Find the limit: $\lim_{x \rightarrow 1} \frac{x^{1/3} - 1}{\sqrt{x} - 1}$.

2. (10%) Find the limit of $g(x)$ as x approaches the indicated values:

$$\lim_{x \rightarrow \sqrt{5}} \frac{1}{x + g(x)} = 2.$$

3. (10%) Find dy/dx by implicit differentiation: $y^2 = \sqrt{\frac{1+x}{1-x}}$.

4. (10%) Show that the function $f(x) = x + \sin^2\left(\frac{x}{3}\right) - 8$ has exactly one zero in the interval $(-\infty, \infty)$.

5. (15%) Graph the function: $y = \frac{\sqrt{1-x^2}}{2x+1}$. (Find where the curve is increasing and where it is decreasing. Find the local extreme points. Find the points of inflection, if any occur, and determine the concavity of the curve. Identify any asymptotes.)

6. (10%) Find the area of the triangular region bounded on the left by $x + y = 2$, on the right by $y = x^2$, and above by $y = 2$.

7. (10%) Find the derivative of y with respect to x if $y = 2(\ln x)^{x/2}$.

8. (10%) Evaluate $\int x^2 \sin(1-x) dx$.

9. (15%) Sketch the region of integration and write an equivalent integral with the order of integration reversed. Then evaluate both integrals.

$$\int_0^{3/2} \int_{-\sqrt{9-4y^2}}^{\sqrt{9-4y^2}} y \, dx \, dy.$$

試題隨卷繳交