

國立臺北大學 112 學年度碩士班一般入學考試試題

系(所)組別：都市計劃研究所甲組

科目：微積分

第1頁 共2頁

☐可 ☒不可使用計算機

1. (10%) Find the domain and range of the following function.

A. $f(x) = \sqrt{8 - 2x^2}$

B. $y = 1 + \cos(x)$

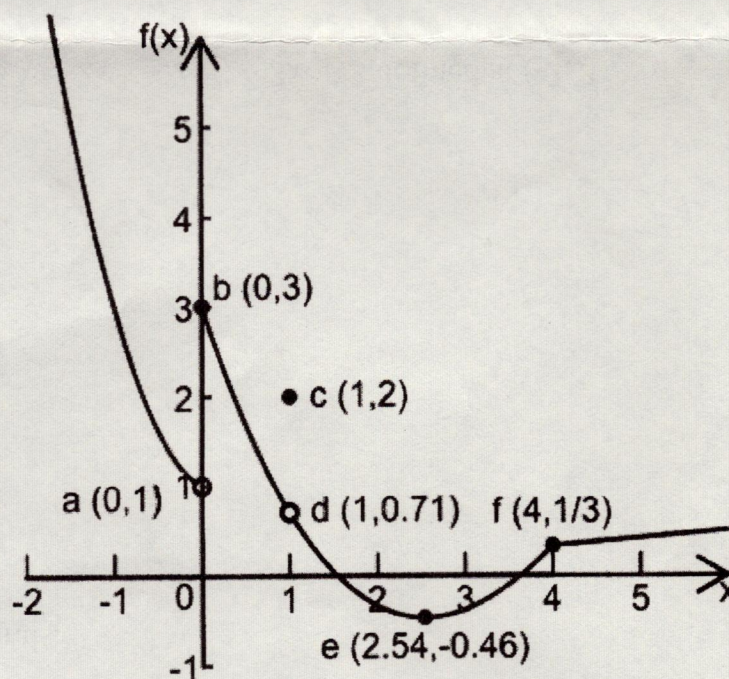
2. (15%) Use the following graph of $f(x)$ to answer the following questions.

A. State the value of each quantity, if it exists. If it does not exist, explain why.

(1) $\lim_{x \rightarrow 0^+} f(x)$ (2) $\lim_{x \rightarrow 0^-} f(x)$ (3) $\lim_{x \rightarrow 0} f(x)$ (4) $\lim_{x \rightarrow 1} f(x)$ (5) $f(1)$.

B. Discuss the continuous points of $f(x)$ at points a, b, c, d, e, f.

C. Discuss the differentiable points of $f(x)$ at points a, b, c, d, e, f.



3. (15%) Evaluate the following limit.

A. $\lim_{x \rightarrow \infty} \left(\frac{x^3 - 2x}{x^2 + 3x - 2} - x \right)$

B. $\lim_{x \rightarrow 4} \frac{\sin(x-4)}{x^2 - 3x - 4}$

C. $\lim_{x \rightarrow 4} \frac{x^2 + 7x - 44}{x^2 - 6x + 8}$

試題隨卷繳交

接背面

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4. (20%) Find dy/dx .

A. $y = 3(3 - x)^2 - 4x + 1$

B. $\sqrt{x} + (2y - 1)^2 = 5$

5. (20%) Evaluate the following integrals.

A. $\int x^2 \ln x \, dx$

B. $\int_3^6 x e^{4(x-3)} dx$

C. $\int x(3 - 2x)^9 dx$

D. $\int \frac{x+1}{x+2\sqrt{x}-3} dx$

6. (10%) Find the local extrema of $f(x) = 2x^3 - 2x^2 - 3x + 2$ defined at $(-2, 3)$.

7. (10%) Find the volume of the solid obtained by rotating the region bounded by the given curves $y = x^{3/2}$, $y = 8$ and $x = 4$ about x axis.