

國立臺北大學 107 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

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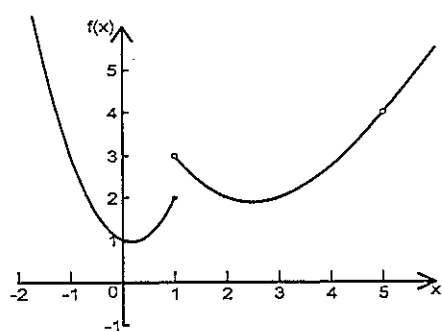
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1. (10%) Find the domain and range of the following function.

A. $f(x) = \sqrt{4 - 3x^2}$
B. $y = 1 + \sin x$

2. (10%) Use the following graph of $f(x)$ to state the value of each quantity, if it exists. If it does not exist, explain why.

A. $\lim_{x \rightarrow 1^-} f(x)$
B. $\lim_{x \rightarrow 1^+} f(x)$
C. $\lim_{x \rightarrow 1} f(x)$
D. $\lim_{x \rightarrow 5} f(x)$
E. $f(5)$



3. (20%) Evaluate the following limit.

A. $\lim_{x \rightarrow \infty} \left(\frac{3x^3 - 2x}{3x^2 + x - 2} - x \right)$
B. $\lim_{x \rightarrow 1} \frac{\sin(x-1)}{x^2 + x - 2}$

4. (20%) Find dy/dx .

A. $y = \sin x + 10 \tan x$
B. $\sqrt{x} + \sqrt{y} = 1$

5. (20%) Evaluate the following integrals.

A. $\int x^2 \ln |x| dx$
B. $\int_3^6 x e^{4x^2+1} dx$

6. (10%) Find the local extrema of $f(x) = x^2 e^{-x}$.

7. (10%) Find the volume of the solid that is bounded by the elliptic paraboloid $x^2 + 2y^2 + z = 16$, the planes $x = 2$, $y = 2$, and the three coordinate planes.