

# 國立臺北大學 103 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

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可 不可使用計算機

- (10%)  $f(x) = x^2 + 2x$   $g(x) = x - 1$ 
  - (5%) Determine  $(f \circ g)(x)$
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- (10%) Suppose  $C(x) = 0.2x^2 + 17x + 95$  is the cost (in dollars) of making  $x$  wheel covers.
  - (5%) What is the fixed cost?
  - (5%) Find the cost of making the 10th wheel covers.
- (10%) Find the numbers  $x$  at which the following function is discontinuous.

$$f(x) = \begin{cases} \sqrt{x^2 + 1}, & x < 0 \\ x + 2, & \\ \frac{1+x}{2-3x}, & x \geq 0 \end{cases}$$

- (10%) Determine the derivative for  $f(x) = \sqrt{x} \left( \frac{1-x^3}{1+x} \right)$
- (10%) Ecologists studying a certain ecological niche determine that overall plant size,  $B(x)$ , is related to the precipitation level  $x$  by the model:

$$B(x) = \frac{40x}{\sqrt{1+x^2}} + 20,$$

- (5%) Find the marginal utility of precipitation,  $B'(x)$ , for this model.
  - (5%) What is the long-term behavior of this marginal utility function?
- (10%) Find all vertical and horizontal asymptotes for  $f(x) = \frac{9+2x^4}{x^2+3x+2}$ .

- (10%) Evaluate  $\int_1^8 \frac{\sqrt[3]{x}}{5+x^{4/3}} dx$ .

- (10%) Evaluate  $\int_1^{\infty} \frac{e^{-\sqrt{x}}}{\sqrt{x}} dx$ .

- (10%) Evaluate  $\int_1^e (\ln x)^2 dx$ .

- (10%) Find a Taylor series for the function  $f(x) = \frac{x}{1-x}$  expanded about  $a=0$ .

試題隨卷繳交