

淡江大學 100 學年度轉學生招生考試試題

系別：商管組二年級

科目：微積分

考試日期：7月18日(星期一) 第4節

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1.(12%) Find the indicated limit if it exists.

$$a). \lim_{x \rightarrow -3} \frac{x^2 - 9}{x + 3} \quad b). \lim_{x \rightarrow 1} \frac{x^2 + x - 2}{x^2 - x} \quad c). \lim_{x \rightarrow 4} \frac{|x - 4| + 2x}{x + 3}$$

2.(12%) Find the derivative of each functions.

$$a). f(x) = (x^2 + 8x - \frac{1}{x})^9 \quad b). g(x) = -e^{-\sqrt{2}x} \quad c). h(x) = \frac{\ln(e^x - x)}{\sqrt{x}}$$

3.(16%) Find the absolute maximum and absolute minimum of the given functions.

i). $f(x) = x^2 - 2x - 3$ on $[-2, 3]$.

ii). $f(x) = \frac{x+1}{x-1}$ on $[2, 4]$.

4.(16%) Find the function $f(x)$ if

i). $f'(x) = -2xe^{-x^2+1}; f(1) = 0$

ii). $f'(x) = 3x^2 + 4x - 1; f(2) = 9$

5.(10%) Find the area of the region bounded by the curves $y = 2 - x^2$ and $y = -x$.

6.(16%)

i) Evaluate the double integral $\int_0^8 \int_1^e \frac{y}{x} dx dy$.

ii) Determine the average value of the function $f(x, y) = 2x + 3y$ over the region defined by $1 \leq x \leq 4$ and $0 \leq y \leq 5$.

7.(13,5%) A manufacturer has \$600,000 to spend on the production of a certain product and determines that if x units of capital and y unit of labor are allocated to production, than P units will be produced, where P is given by the Cobb-Douglas production function $P(x, y) = 120x^{0.8}y^{0.2}$. Suppose each unit of labor costs \$3,000 and each unit of capital costs \$5,000.

i). How many units of labor and capital should be allocated in order to maximize production ?

ii). Suppose the manufacturer is given an extra 1,000 dollars. Estimate how many additional units of production can be derived from this 1,000 ?