

東吳大學 108 學年度碩士班研究生招生考試試題

第 1 頁，共 2 頁

系級	企業管理學系碩士班 C 組	考試時間	100 分鐘
科目	微積分	本科總分	100 分

每題 10 分，指數值如果無法算出，可保留指數項至最精簡處。

1. City and Country Cycles finds that if it sells x racing bicycles per month, it's costs will be $C(x) = 20x + 72,000$ and its revenue will be $R(x) = -3x^2 + 1,800x$ (both in dollars).
 - a. Find the store's break-even points.
 - b. Find the number of bicycles that will maximize profit, and the maximum profit.

2. If a person's temperature after x hours of strenuous exercise is $T(x) = x^3(4 - x^2) + 98.6$ degrees Fahrenheit (for $0 \leq x \leq 2$), find the rate of change of the temperature after 1 hour.

3. Based on a recent study, the "happiness" of people who live in a country whose average temperature is t degrees Fahrenheit is given by $h(t) = 8.2 - (0.01t - 2.8)^2$, for $35 \leq t \leq 72$ ("Happiness" was rated from 1 = "not at all happy" to 4 "very happy".) Find $h(40)$ and $h'(40)$. Interpret your answer.

4. A politician estimates that by campaigning in a country for x days, she will gain $2x$ (thousand) votes, but her campaign expenses will be $5x^2 + 500$ dollars. She wants to campaign for the number of days that maximizes the number of votes per dollar, $f(x) = \frac{2x}{5x^2 + 500}$. For how many days should she campaign?

5. A liquor distributor wants to increase its revenues by discounting its bestselling liquor. If the demand function for this liquor is $D(p) = 60 - 3p$, where p is the price per bottle, and if the current price is \$15, will the discount succeed?

6. In 2013, Amazon's annual revenue was 74 billion dollars and growing at the rate of $3.2x + 17.4$ billion dollars per year, where x is the number of years since 2013. Find a formula to predict Amazon's annual revenue at any time x and use your formula to predict their revenues in 2020.

7. An epidemic is spreading at the rate of $12e^{0.2t}$ new cases per day, where t is the number of days since the epidemic began. Find the total number of new cases in the first 10 days of the epidemic.

8. A subject can perform a task at the rate of $\sqrt{2t + 1}$ tasks per minute at time t minutes. Find the total number of tasks performed from time $t = 0$ to time $t = 12$.

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第 2 頁，共 2 頁

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9. A company's output is given by the Cobb-Douglas production function $P = 400L^{3/5}K^{2/5}$, where L and K are the numbers of units of labor and capital. Each unit of labor costs \$50 and each unit of capital costs \$60, and \$1500 is available to pay for labor and capital. How many units of labor and of capital should be used to maximize production?
10. A clothing designer's sales S depends on x , the amount spent on TV advertising, and y , the amount spent on print advertising (both in ten thousands of dollars), according to the function $S(x,y) = 60x^2 + 90y^2 - 6xy + 200$. Find $S_x(2,3)$ and $S_y(2,3)$, and interpret these numbers.