

國立臺灣師範大學 107 學年度碩士班招生考試試題

科目：微積分

適用系所：全球經營與策略研究所

注意：1.本試題共 2 頁，請依序在答案卷上作答，並標明題號，不必抄題。2.答案必須寫在指定作答區內，否則依規定扣分。

請注意：每一題均須列出過程，只有答案不予計分

1. A media company is producing DVDs.
 - (a). It costs \$12,000 to set up the machines to make the copies. The marginal cost for producing q copies is $5 + \frac{q}{5,000}$. Write a formula for the total cost $C(q)$ as a function of production level q . (本題 10 分)
 - (b). According to the marketing research, the highest price at which the company can sell all q of the DVDs is $20 - \frac{q}{10,000}$. Write a formula for the revenue $R(q)$ derived from selling all q DVDs at this price. (本題 10 分)
 - (c). How many DVDs should they make and sell to maximize their profit? What is their maximum profit? (本題 10 分)
2. Use linear approximation to estimate the following:
 - (a). $\sqrt{17}$ (本題 5 分)
 - (b). $\sqrt{53}$ (本題 5 分)
 - (c). $\ln(0.9)$ (本題 5 分)
 - (d). $\ln(1.5)$ (本題 5 分)
3. Find the Maclaurin polynomial of order 4 for $f(x) = \sin 2x$. Then use it to approximate each of the following:
 - (a). $f(0.1)$ (本題 5 分)
 - (b). $f(0.23)$ (本題 5 分)
4. In the following problems, please find the indicated integrations.
 - (a). $\int \frac{6e^{1/x}}{x^2} dx$ (本題 10 分)
 - (b). $\int \frac{e^x}{4 + 9e^{2x}} dx$ (本題 10 分)

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(c). $\int \frac{x^2 - x}{x+1} dx$ (本題 10 分)

5. A colony of bacteria is growing exponentially with a rate constant of **0.02** when time is measured in days. There are 2 million of them right now. How many days will it take for the colony to grow to 10 million? (本題 10 分)