

國立嘉義大學九十六學年度
管理研究所碩士班招生考試（乙組）試題

科目：應用微積分

1. Differentiate the following function: (10 分)

$$f(x) = 2(3x+1)^4(5x-3)^2$$

2. A manufacturer knows that when he charges p dollars per unit for his product, he will be able to sell $x = 380 - 20p$ units. He also estimates that at this level of production, his average cost is $A(x) = 5 + \frac{x}{50}$.

What price should the manufacturer charge in order to maximize profit? (10 分)

3. The owner of a novelty store can obtain joy buzzers from the manufacturer for 70 cents apiece. He estimates he can sell 60 buzzers when he charges \$1.00 apiece for them and that he will be able to sell 14 more buzzers for every 8 cent decrease in price. What price should he charge in order to maximize profit? (10 分)

4. The personnel manager of a department store estimates that if she hires n temporary salespersons for the holiday season, the total net revenue derived from their efforts will be

$R(n) = \frac{1}{29}(-n^3 + 6n^2 + 63n + 1080)$ hundred dollars for $0 \leq n \leq 12$. How many salespersons should be hired in order to maximize total net revenue? (10 分)

5. The daily output at a certain factory is $Q(L) = 20000L^{\frac{1}{2}}$ units, where L denotes the size of the labor force measured in worker-hours. Currently, 900 worker-hours of labor are used each day. Estimate the effect on output that will be produced if the labor force is cut to 885 worker-hours. (10 分)

6. 計算下列各題（每題 10 分，共 50 分）

(1) 試求 $\lim_{t \rightarrow 0} \frac{1}{t} \int_0^{2t} \sqrt{1 + \cos 3x} dx$.

(2) 試求 $\int_0^1 \frac{1}{\sqrt{x(1+x)}} dx$.

(3) 試求 $\int_0^{\frac{\pi}{2}} \int_0^1 x \sin(xy) dx dy$.

(4) 試求函數 $f(x, y) = xy$ 在圓 $x^2 + y^2 = 1$ 上之最大值.

(5) 試求函數 $g(x) = x^2 \ln x$ 之最小值.