科目： 微積分　　　　　　系所組：企業管理學系 管理學碩士班 乙組

請依照下列規則與格式，以橫式書寫方式將最終答案寫在彌封答案卷第一頁。
並將各題之求解計算過程，由答案卷第二頁開始書寫，請註明題號。

1 (a).	1 (b).	
2.		
3.		
4.		
5.		
6 (a).	6 (b).	
7 (a).	7 (b).	7 (c).

1. 未按作答格式作答者，扣該科總分 10 分。
2. 未在彌封答案卷內作答者，不予計分。
3. 無求解計算過程者，該題不予計分。

1. (16 points) Find (a) $\lim_{n\to\infty} \dfrac{\sqrt{n^4-8n}-\sqrt{n^4-3n^2+5}}{6}$　　(b) $\lim_{n\to\infty}\left(\dfrac{5n+3}{5n-2}\right)^{2n-7}$

2. (10 points) Find the derivative of $f(x) = \ln\left(\sqrt[3]{1+sinx}\right) + \cos(\ln(x))$

3. (10 points) Evaluate the definite integral $\int_0^{\frac{\pi}{4}} tan^4 t \, sec^2 t \, dt$

4. (16 points) Find the second partial derivatives f_{xy} and f_{yz} of $f(x,y,z) = ye^{z^2} + xe^{xy}\ln(z)$ (5+5=10 points) and evaluate each at the point $(1, 0, e)$ (3+3 points)

5. (15 points) Compute the area enclosed by the parabola $y^2 = -2x + 8$ and the line $y = x - 4$.

6. (15 points) ABC company produces two products, in quantities x and y. Because of the limitation of resources, the manufacturing quantities must satisfy the equation $3x^2 + 2xy + 5y^2 = 36,000$. If the company's profit function is $P(x,y) = 8x + 5y$ thousand dollars, please (a) determine the quantities of each product to maximize the profit, and (b) find the maximum profit.

7. (6 points x 3 = 18 points) A toy manufacture estimates the annual demand for a toy car to be 10,000. It costs $200 to set the machinery for the toy car, plus $5 to produce each toy car. Suppose that it costs the company $1 to store a toy for a year. In order to minimize the total cost,
   (a) How many toy cars should be produced for each manufacturing order?
   (b) How many production runs will be needed for one year?
   (c) What is the total annual cost under such order arrangement?

注意：1. 考生須在「彌封答案卷」上作答。
　　　2. 本試題紙空白部份可當稿紙使用。
　　　3. 考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。