系別：產業經濟學系三年級   科目：微 積 分

考試日期：7 月 19 日(星期二) 第 4 節   本試題共 6 大題，1 頁

1.(15%) Compute the derivatives of

$$a).\ f(x) = ln\frac{1}{2x^3} \quad b).\ y = (3x+2)^4(5x-1)^2 \quad c).\ z = x^{lnx}$$

2.(20%) Find the relative extrema of

$$(a)f(x) = x^4 - 4x^3 + 10, \quad (b)g(x,y) = 1 - (x^2 + y^2)^{1/3}.$$

3.(20%) A company makes two substitute products whose demand functions are $x_1 = 200(p_2 - p_1)$, $x_2 = 500 + 100p_1 - 180p_2$, where p_1 and p_2 are the prices per unit and x_1 and x_2 are the numbers of units sold. The cost of producing the two products are \$ 0.5 and \$ 0.75 per unit.

(a) Find the cost, revenue and profit functions.

(b) Find the prices that will yield maximum profit.

4.(15%) Find the following integrals:

$$(a).\ \int \sqrt{\ln x}\,\frac{1}{2x}dx \quad (b).\ \int x^2 e^{8x^3}dx. \quad (c).\ \int_1^e \ln x\,dx.$$

5.(20%) Evaluate the double integral over the region R

a). $\int\int_R x^3 e^{x^2 y}dA, \quad R: 0 \le x \le 1, 0 \le y \le 1$

b). $\int\int_R \frac{ln(xy)}{y}dA, \quad R: 1 \le x \le 3, 2 \le y \le 5$

6.(10%) Money is transferred continuously into an account at the constant rate of \$2,400 per year. The account earns interest at the annual rate of 6% compounded continuously. How much will be in the account at the end of 5 years? What is the present value of this income stream during 5 years? $(e^{0.3} = 1.35, e^{-0.3} = 0.74)$