淡江大學 99 學年度轉學生招生考試試題

系別：產業經濟學系三年級　　科目：微　積　分

本試題共 6 大題，1 頁

1. Evaluate each of the followings. (7% each)

(a) $\int_e^{\infty} \frac{1}{x(\ln x)^2} dx$　　(b) $\int x^3 e^{x^2} dx$　　(c) $\frac{d^2}{dx^2}(e^{\sqrt{x+1}} + \ln((x^2+2)^3)))$

(d) $\lim_{x\to\infty} \frac{\sqrt{x^2+10x+1}}{x+5}$　　(e) $\lim_{n\to\infty} \frac{1}{n}(\frac{1/n}{\sqrt{1+(1/n)^2}} + \frac{2/n}{\sqrt{1+(2/n)^2}} + \cdots + \frac{n/n}{\sqrt{1+(n/n)^2}})$

(f) For $x^4 + y^4 - 2x^2y^2 = 9$, find $\frac{dy}{dx}$ and evaluate it at $x = 2, y = 1$.

2. Evaluate the double integral. (9% each)

(a) $\iint_R (y + x^3 \ln x) dA;\ R = \{(x,y): 1 \le x \le 2, 0 \le y \le 1\}$

(b) Evaluate $\int_0^2 (\int_{x^2}^4 xe^{y^2} dy) dx$

3. (10%) If x thousand dollars is spent on labor and y thousand dollars is spent on equipment, the production function is modeled by

$$Q(x, y) = 30x^{1/3}y^{2/3}$$

Units. Assume that there is \$120,000 available. Use Lagrage multipliers to allocate money between labor and equipment to make the largest production.

4. (10%) Find the relative extreme values of

$$f(x, y) = x^2 + y^3 - 6x - 12y$$

5. (10%)A cylinder is measured to have radius r and height h, but these measurements may be in error by up to 1%. Estimate the resulting percentage error in calculating the volume of the cylinder.

6. (10%) Find the area between the curves $y = 12 - 3x^2$ and $y = 4x + 5$ from $x = 0$ to $x = 3$