朝陽科技大學 97 學年度碩士班招生考試試題

系（所）別：企業管理系
組　　別：一般生乙組
科　　目：微積分

總分：100 分

1. The cost of producing x units of a particular commodity is $C(x)=\frac{1}{3}x^2+4x+53$ dollars, and the production level t hours into a particular production run is $x(t)=0.2t^2+0.03t$ units. At what rate is cost changing with respect to time after 4 hours? (10%)

2. Country Motorbikes Incorporated finds that it costs \$200 to product tech motorbike, and that fixed costs are \$1500 per day. The price function is $p(x)=600-5x$, where p is the price (in dollars) at which exactly x motorbikes will be sold. Find the quantity Country Motorbikes should produce and the price it should charge to maximize profit. Also find the maximum profit. (15%)

3. Differentiate the following functions: (10%)
   (a) $f(x)=\ln(\frac{x+1}{x-1})$　　(b) $f(t)=\sqrt{\ln t+t}$

4. A citrus grower estimates that if 60 oranges trees are planted, the average yield per tree will be 400 oranges. The average yield will decrease by 4 oranges per tree for each additional tree planted on the same acreage. How many trees should the grower plant to maximize the total yield? (15%)

5. A tire manufacturer estimates that q (thousand) radial tires will be purchased (demanded) by wholesalers when the price is $p=D(q)=-0.1q^2+90$ dollars per tire, and the same number of tires will be supplied when the price is $p=S(q)=0.2q^2+q+50$ dollars per tire. (a) Find the equilibrium price (5%) (b) Determine the consumers' and producers' surplus at the equilibrium price. (10%)

6. Evaluate the following equations:
   (a) $\int_0^1 \frac{x}{e^{2x}}dx$ (10%)　　(b) $\int_1^{e^2} x\ln\sqrt[3]{x}\,dx$ (10%)

7. A company's output is given by the Cobb-Douglas production function $p=200L^{\frac{3}{4}}K^{\frac{1}{4}}$, where L and K are the numbers of units of labor and capital. Each unit of labor costs \$50 and each unit of capital costs \$100, and \$8000 is available to pay for labor and capital.
   (a) How many units of labor and of capital should be used to maximize production? (10%)
   (b) Evaluate and give an interpretation for $|\lambda|$. (5%)