考 試 科 目	微積分	系 所 別	企業管理研究所 （MBA 學位學程乙組)	考 試 時 間	2 月 7 日(五) 第四節

1. (30 points) Let $f(x)$ be the probability density function of a normal distribution with mean μ and variance σ^2. Let

$$g(x) = 10x + 20 \int_{-\infty}^{x} (t - x)f(t)dt.$$

   (a) (10 points) Find the critical points of $g(x)$.

   (b) (20 points) Find the local extreme values of $g(x)$, and determine whether they are local maxima, local minima, global maxima, or global minima.

2. (40 points) Suppose that the price equation is $p = 200 - 3x$, and the cost function is $C(x) = 75 + 80x - x^2$, $0 \le x \le 40$.

   (a) (10 points) Determine the value of x and the corresponding price that maximize the profit.

   (b) (10 points) If the government imposes a tax of $4 per unit quantity produced, determine the new price that maximizes the profit.

   (c) (10 points) Suppose that the government imposes a tax of T dollars per unit quantity produced, where $0 \le T \le 120$. Determine the value of x that maximizes the profit.

   (d) (10 points) Assume that the company cut back production to the level you obtained in (c). Express the tax revenues received by the government as a function of T, and determine the value of T that will maximize the tax revenue received by the government.

3. (15 points) Use Newton's method to perform four iterations to find a local extremum of $f(x) = x^3 - 2x^2 + 2$ with $x_0 = 3/4$.

4. (15 points) Obtain the Taylor expansion for $\log(1 - x)$ for $-1 \le x < 1$. Then, use it to obtain a formula for $\log 2$.

備 註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。