(102)輔仁大學碩士班招生考試試題	考試日期：102 年 3 月 8 日第 / 節
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科目：個體經濟學　　系所組：經濟學系

1. Suppose a consumer have utility $U = u(x, y)$ when he consumes two goods x and y.
   (a) (6pts) Please define marginal utility (MU) with respect ot x and y, and marginal rate of substitution (MRS) for x and y.
   (b) (6pts) Please fine the MRS of the following utilities:
   (1) $U = 10 + (x-2)^2 + (y-3)^2$,
   (2) $U = 10 + (x-2)^2(y-3)^2$ with $x > 2$ and $y > 3$,
   (3) $U = 10 + \min\{3x + y, x + 5y\}$.
   (c) (6pts) Do the above utilities all satisfy the property of convexity? Prove your answer.

2. Mary has an income of \$400 in period 1 and will have an income of \$600 in period 2. His utility function is $U(c_1, c_2) = \frac{1}{3}\ln c_1 + \frac{2}{3}\ln c_2$. The interest rate is 0.5. Please answer the following questions.
   (a) (6pts) Draw the budget line of Mary's consumption problem and then specify the intercept and the slope. Please also specify Mary's endowment.
   (b) (6pts) What is the optimal consumption bundle?
   (c) (6pts) Will Mary be a lender or a borrower in consumption? Show it.
   (d) (6pts) If the interest rate goes up to be 0.75, will she be a lender or a borrower? Show it.

3. Suppose a firm's production function being $q = x_1^{a_1}x_2^{a_2}$, where q is output and x_1, x_2 are inputs. The factor price of x_1 and x_2 are w_1 and w_2, respectively.
   (a) (10pts) Given $a_1 = 1/3$, $a_2 = 1/3$, what is the profit function?
   (b) (10pts) Given $a_1 = 1/2$, $a_2 = 1/2$, what is the cost function?

4. (a) (8pts) What is Warlas' law? What is Walrasian equilibrium?
   (b) (10pts) Let x and y be two goods and $\omega_i = (e_x, e_y)$ be consumer i's endowments for x and y goods. There are two consumers A and B with the following utilities U_i and endowments ω_i.
   $$U_A(x_A, y_A) = a\ln x_A + (1-a)\ln y_A, \quad \omega_A = (0, 2);$$
   $$U_B(x_B, y_B) = \min\{x_B, y_B\}, \quad \omega_B = (2, 0).$$
   Herein $0 < a < 1$. Calculate the market clearing prices and the equilibrium allocation.

5. Suppose that firm 1 can produce an item at a constant marginal cost of \$$c_1$ per unit while firm 2 can produce it at a marginal cost of \$$c_2$ per unit. In addition, the demand curve for the industry is $P = a - Q$, where P is the market price, Q is the industry output, and a is a constant with $a > c_2 > c_1$.
   (a) (10pts) Suppose firm 1 is an industry leader. Find the Stackelberg duopoly outcome: firm 1's quantity and firm 2's quantity.
   (b) (10pts) Social welfare (SW) is defined as SW = consumers' surplus + firms' profits. Please find SW=?.

※ 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。