國立臺北大學九十一學年度博士班招生考試試題

可使用計算

系所別：經濟學系

科　目：個體經濟學

1. Player 1 and 2 are assumed to play a game. Both players has two possible choices, A or B. Both players will get a if A is chosen by both players, and obtain d if B is taken by both players. When players take different actions, the player choosing A will get b, and the other player gets c. It is assumed that $c > a > d > b > 0$.

   (1) Suppose each player maximizes his payoff. Derive all the pure Nash equilibria. (3 points)

   (2) Now suppose player i's utility from playing x give his opponent playing y is

   $$U_i(x,y) = \pi_i(x,y) + \gamma\pi_j(x,y), \quad i \neq j, \quad x, y \in \{A, B\},$$

   where $\pi_i(x,y)$ and $\pi_j(x,y)$ are player i's and j's payoff given actions x and y are taken by player i and j, respectively. And γ is a positive scalar. Suppose each player maximize his utility, instead of payoff.

   (2a) Derive the conditions for (A, B) being a Nash equilibrium. (5 points)

   (2b) Derive the conditions for (A, A) being a Nash equilibrium. (5 points)

   (2c) Derive the conditions for (B, B) being a Nash equilibrium. (5 points)

2. Consider the following Cournot game with incomplete information. Suppose firms 1 and 2 face the inverse demand function $p = 2 - Q$ where Q is the total output of both firms, and p is the price of output. For simplicity, there is no fixed production cost for both firms. Firm 1's marginal production cost is 1, which is known to all the players. However, firm 2's marginal production cost is either $\frac{1}{4}$ or $\frac{3}{4}$, which is known for player 2 only. However, firm 1 believes that both situations will occur equally. Each firm is assumed to maximize his expected profit.

   (1) Write down the strategy spaces of both players. (5 points)

   (2) Derive the Bayesian Nash equilibrium. (10 points)

3. (1) State the first and second theorems of welfare economics. (5 points)

   (2) Consider a simple economy with two players consuming one good. Player 1's utility function is $U^1 = U^1(x_1, x_2)$ where x_1, x_2 are consumption amounts of players 1 and 2, respectively. Player 1 may transfer $h \geq 0$ to player 2. So the budget constraint of player 1 is $px_1 + h = I_1$, where p and I_1 are the price of output and player 1's income, respectively. Player 2's utility function is $U^2 = U^2(x_2)$ and his budget line is $px_2 = h + I_2$, where I_2 is player 2's income. Suppose both players maximize their utilities given their budget constraints. U^1 and U^2 are assumed to be concave. Based upon the model above, show that the first theorem of welfare economics does not hold. (10 points)

試題隨卷繳交（接背面）

國立臺北大學九十一學年度博士班招生考試試題

可使用計算機

系所別：經濟學系　　共二頁

科　目：個體經濟學　　第二頁

4. Consider an individual that has an initial wealth w and a property valued at L that is subject to a fire risk. In order to protect himself against the risk, the individual can buy an insurance policy from an insurance company. The company and the individual have the same prior as to the probability that a fire will occur. Denote this probability by p, which is constant and is independent of individual's effort. The individual can insure the entire value of the property, or only a part of this value. Call the amount that he decides to insure the 'coverage,' and denote it by q. The company demands a price for providing coverage of an indemnity of q should the property burn down. This price is known as the premium, and we denote it by ρ. The company is assumed to be risk-neutral and the individual's utility function is $u(w)$ with $u'(w) > 0, u''(w) < 0$.

   (1) Find the individual's reservation utility, which is defined as the individual's expected utility without the insurance. (3 points)

   (2) Suppose the insurance company chooses the premium and the coverage to maximize his expected profit given that the individual's expected utility from the insurance is no less than the reservation utility defined in part (1). Derive the optimal premium and the coverage offered to the risk-averse individual. And show the insurance company has positive profit. (14 points)

5 The substitution matrix of a utility-maximizing consumer's demand system at prices $(8, p)$ is $\begin{pmatrix} a & b \\ 2 & -1/2 \end{pmatrix}$. Find a, b and p. (10 points)

6 Prove that short-run supply and short-run variable input demands are homogeneous of degree zero in p and w, where p and w are the price for output and the associated prices for variable inputs, respectively. (10 points)

7 Use the envelope theorem to show the following propositions:

   (1) Roy's identity.

   (2) If the consumer's budget changes from (P^o, m^o) to (P^1, m^1), and let $u^o \equiv v^o(P^o, m^o)$, and $u^1 \equiv v^1(P^1, m^1)$, then $\frac{\partial CV}{\partial u^o} < 0, \frac{\partial EV}{\partial u^1} > 0$.

   (3) The marginal utility of income is equal to the Lagrangian multiplier associated with the utility-maximizing problem (15 points)