

AUSTRALIAN NATIONAL UNIVERSITY

Second Semester Examination - 2005

PRINCIPLES OF PUBLIC ECONOMICS (ECON8034)

Study Period : 15 minutes

Time Allowed : 3 hours

Permitted Material: Calculators – non programmable

ANSWER THE FOLLOWING 6 QUESTIONS EACH QUESTION IS WORTH 10 FOR A TOTAL OF 60

QUESTION 1

Consider two individuals (A and B) and two goods (X , private good, and G , public good). Individuals' preferences are represented by utility functions:

$$U^A = U(X^A, G), U^B = U(X^B, G).$$

- (a) Derive the condition for the efficient supply of public goods by solving the following maximization problem:

$$\text{Max}_{X^A, X^B, G} W(U^A, U^B) \text{ s.t. } X^A + X^B + c(G) = R,$$

where $c(G)$ represents the cost of producing G measured in units of good X (which is assumed to be the numeraire), and R is the amount of resources available. (7 points)

- (b) Explain in detail the intuition behind. (3 points)

QUESTION 2

A chemical producer dumps toxic waste into a river. The waste reduces the population of fish, reducing profits for the local fishery industry by \$150000 per year. The firm could eliminate the waste at a cost of \$100000 per year. The local fishing industry consists of many small firms.

- (a) State and discuss the Coase Theorem. (2.5 points)
(b) Apply the Coase Theorem to the example above. (2.5 points)
(c) Verify the Coase Theorem if the cost of eliminating the waste is doubled to \$200000 (with the benefit for the fishing industry unchanged at \$150000). (2.5 points)
(d) Why might bargaining not be costless? (2.5 points)

QUESTION 3

If savings do not respond to changes in the interest rate, does it mean that there is no deadweight loss associated with the taxation of interest? Justify in detail your answer and provide a graphical representation. (10 points)

QUESTION 4

Derive the optimal inverse elasticity rule for commodity taxation. To do so, assume fixed producer prices and zero cross-price effects, and solve the following maximization problem:

$$\max V(q, y) \text{ subject to } R(t) = \sum_{i=1}^n t_i x_i \geq \bar{R},$$

where $V(q, y)$ is the indirect utility function of the representative individual, q is the vector of consumer prices q_i , for each commodity x_i , which differ from the producer prices p_i by the amount of a specific tax t_i (i.e., $q_i = p_i + t_i$), and y is the individual's income. Explain the intuition behind the result. (10 points)

QUESTION 5

- (a) In the context of the Mirrlees economy, explain both in words and graphically why the first-best solution cannot be attained in the absence of complete information about individual's abilities. (5 points)
- (b) Discuss the role of the self-selection constraints (SSCs) in the second-best problem and provide a graphical representation of the optimal non-linear income tax for the 2-ability case. (5 points)

QUESTION 6

- (a) Explain what we mean by a federal (i) block grant, (ii) categorical grant and (iii) matching grant. (2.5 points)
- (b) Consider a community that makes different spending decisions when offered a block grant than when offered a categorical grant of equal size.
 - (i) Does the community reach a higher level of social welfare under the block grant?
 - (ii) Does the categorical grant elicit more spending in the designated category than the block grant does?
 - (iii) Does the categorical grant elicit a level of community expenditures in the designated category equal to the size of the grant?For each (i) to (iii), provide a detailed justification and a graphical representation. (2.5 points for each (i) to (iii))

