

Binghamton University
MICROECONOMICS COMPREHENSIVE EXAM
January 2009

PLEASE ANSWER ALL QUESTIONS

Section A

State whether each of the following statements is *True, False, or Uncertain*.
Provide a *justification* for your answer in each case.

1. (Khanna) A firm's output decision is not affected by a lump-sum tax on each firm in the industry, so equilibrium industry output is not affected by a lump-sum tax.
2. (Yang) A famous Chinese economist concludes that because major factors such as capital, land, and resources are under-valued in China, China should use cheap labor to boost economic growth.
3. (Yang) One can find at least two identical relative price vectors on a simplex.
4. (Pape) **Pie.** Every day, Bob goes to the Skylark diner and eats a Spiedie sub with a slice of pie for dessert. On Monday, the available pies were Apple, Blueberry, and Cherry, and Bob chose Blueberry. On Tuesday, the available pies were Apple, Blueberry, and Lemon, and Bob chose Lemon. On Wednesday, the available pies were Blueberry, Cherry, or Peach, and Bob chose Cherry. **Claim:** When it comes to pie flavors, Bob is irrational.
5. (Pape) **Constant Returns to Scale Production.** X-ray machines (x) are made by a constant-returns to scale production function $f(K,L)$, in inputs L (labor) and K (capital). **Claim:** At prices w and r for labor and capital, respectively, there is an optimal ratio of labor to capital; however, so long as the price p of x-ray machines is such that the owner makes a profit on the first x-ray machine, there is *no* optimal *amount* of labor or capital. (Note that this claim is true only if both parts of the claim are true.)

Section B
Short answer questions

6. (**Khanna**) Suppose the production functions of wheat (W) and fish (F) are as follows: $W = K^{1/3}L^{2/3}$, and $F = K^{2/3}L^{1/3}$, where K and L are the inputs, capital and labor, respectively. Currently, one half of the total capital stock \bar{K} and one half of the total labor \bar{L} is allocated to each output. Is this allocation optimal? Why? How would you reallocate both outputs?
7. (**Khanna**) Suppose I consume two goods, X and Y , and that I am a conspicuous consumer, that is, my utility depends not only on my own consumption of these two goods, but also on the consumption \tilde{X} and \tilde{Y} by my neighbor, the Joneses. In other words, suppose that my utility function is given by $U(X, Y, \tilde{X}, \tilde{Y})$, where \tilde{X} and \tilde{Y} refer to the consumption of these two goods by the Joneses. $U(\bullet)$ satisfies the standard properties and is quasi-concave in X and Y .

Further, let us assume that I like to “keep up with the Joneses,” which is the same thing as saying that $\frac{\partial MU_X}{\partial \tilde{X}} = f(X, Y, \tilde{X}) > 0$ and $\frac{\partial MU_Y}{\partial \tilde{Y}} = g(X, Y, \tilde{Y}) > 0$. Note that my marginal utility of X depends on \tilde{X} but not on \tilde{Y} , and vice versa.

- a. Given \tilde{X} and \tilde{Y} , how do I decide how much X and Y to consume? That is, what is the first order condition that my utility maximizing consumption bundle must satisfy? How does it compare with the standard first order condition for utility maximization? Justify your answer intuitively.
- b. Now suppose that the Joneses increase their consumption of these two goods, ie, both \tilde{X} and \tilde{Y} increase. How will this affect my optimal consumption of X and Y ?

Note: you may use calculus to answer this question. However, the question can also be answered easily using simple intuition, which is just as acceptable.

8. (**Yang**) Assessing an equilibrium allocation (\mathbf{X}^* , G^*), it is discovered that

$$\sum_{h=1}^H MRS_{G,X}^h > MRT_{G,X}$$

at this allocation. Here X is private good, G is public good, and h is the index for agents. From social viewpoint, is the public good over-provided or under-provided? Why?

9. (Yang) Please show that oligopolistic competition is inefficient, using externality arguments.
10. (Pape) John's utility for consumption c is $u(c)$, where $u' > 0$, $u'' < 0$ for all c . John can buy certificates today for \$1 each. The A-type certificates will provide him with one unit of consumption if the state of the world turns out to be A tomorrow; the B-type certificates will provide him with one unit of consumption if the state of the world turns out to be B tomorrow. A and B are the only two possible states of the world tomorrow, and these certificates are John's only source of consumption tomorrow. As state A becomes less likely, will John spend more or less on A-type certificates? Answer and show why your answer is true.
11. (Pape) Suppose you run a company which produces some product x . The production of x involves a fixed cost of \$2000, and a marginal cost of production of \$0. Moreover, demand is given by $q_D(p) = 100 - p$.
- Suppose this company is a monopolist. Find the profit maximizing price and quantity. What is your profit?
 - Suppose a new CEO is threatening to enter this market. Suppose you, as the current CEO of this company, could write him a letter to discourage him. What argument could you use to convince him not to enter? Assume that all the information above is verifiable fact (fixed cost, marginal cost, demand.)

Section C
Longer problems

12. (Yang) Consider a two-person exchange economy where agents A and B have utility functions $U^A = x_1^{0.3} x_2^{0.7}$, $U^B = x_1^{0.4} x_2^{0.6}$ and endowments $\omega^A = (8, 2)$, $\omega^B = (2, 8)$ respectively.
- (i) Please find the Walrasian Equilibrium allocation and market clearing price;
 - (ii) Identify the set of the *core* allocations;
 - (iii) Which feasible allocation supports equilibrium price $\mathbf{p}^* = (1, 1)$?
13. (Yang) Please show, in precise notations, that the Walrasian equilibrium without transfers of an exchange economy can be expressed as a social optimum.
14. (Pape) Two kids, Seeker and Hider, play Hide and Seek in a house with n rooms. Hider chooses privately which room to hide in, and then Seeker chooses which room to search in. If Seeker chooses the room Hider chose, Seeker wins one point, and Hider wins zero. If Seeker chooses a different room, then Hider wins the point and Seeker wins zero.
- a. Draw the extensive form of this game for $n = 3$. Draw the normal form for $n=3$.
 - b. Find all Nash equilibria for this game for a general n . Argue why each are Nash equilibria and why there are no other Nash equilibria. Also for each equilibrium: what is the probability that Hider will be found?
15. (Pape) One day, n wardrobes are installed in the first room of the house above. If Hider chooses to hide in this room, she also must choose a wardrobe. If Seeker chooses to seek in this new room, he, also, must choose a wardrobe. The natural rules apply: if Seeker chooses both Hider's room and wardrobe, then she is found, and Seeker wins one point while Hider loses.
- a. Draw the extensive form of this game for $n=3$.
 - b. Find all Nash equilibria for this game for a general n . Argue why each are Nash equilibria and why there are no other Nash equilibria. Also for each equilibrium: what is the probability that Hider will be found?