YORK UNIVERSITY Faculty of Graduate Studies

Final Examination December 15, 2015

Economics 5010 BF3.0 : Applied Microeconomics S. Bucovetsky

time=2.5 hours

Do any **6** of the following 10 questions. All count equally.

1. Calculate the Marshallian demand functions, and the indirect utility function, for a consumer whose preferences can be represented by the utility function

$$u(x_1, x_2, \ldots, x_n) = 100 - \frac{1}{x_1} - \frac{1}{x_2} - \cdots - \frac{1}{x_n}$$

2. Give three different statements which are equivalent to the following statement about two risk averse von Neumann–Morgenstern expected utility maximizers : "person 1, with utility–of–wealth function $U(W)$ is more risk averse than person 2, with utility–of–wealth function $V(W)$".

3. Prove that a perfectly competitive firm's unconditional demand function for some input to production must be a non–increasing function of the price of that input.

4. What is the equation of the long–run industry supply curve of a perfectly competitive industry in which there are a large number of identical firms, each of which has the same total cost function

$$TC(y) = y^3 - 40y^2 + 550y$$

where $TC(y)$ is the total cost of producing y units of output?

continued

5. Is there a Cournot–Nash equilibrium in which exactly **2** firms produce positive quantities of output in the following industry? There are exactly **3** firms in the industry. Each firm produces the identical product. The demand function for the good has the equation

$$Q = 15 - p$$

and each firm's total cost function has the equation

$$TC(q) = 12 + 3q \quad q > 0$$
$$= 0 \qquad\qquad q = 0$$

where q is a firm's quantity produced, Q is total industry output, and p is the price.

6. Find an allocation which is in the core, but which is **not** a competitive equilibrium allocation, for the following economy.

There are 3 people, and two goods. Each person has the same preferences, which can be represented by the utility function

$$u^i(x_1^i, x_2^i) = x_1^i x_2^i$$

Person 1 and person 2 each have the endowment vector

$$\mathbf{e}^1 = \mathbf{e}^2 = (6, 0)$$

and person 3 has the endowment vector

$$\mathbf{e}^3 = (0, 12)$$

continued

7. How does a person's equilibrium consumption bundle (x_1^i, x_2^i) vary with her endowment e_2^i of good 2 in the following perfectly competitive exchange economy?

There are 1 million people. Person i has an endowment vector $(1, e_2^i)$ with

$$\sum_i e_2^i = 1000000$$

so that person i's share of the economy's total endowment of 1000000 units of good 2 is $e_2^i/1000000$.

Each person has the same preferences, which can be represented by the utility function

$$u(x_1^i, x_2^i) = x_1^i + \log(x_2^i)$$

8. Write down the following game in strategic form, and find all its Nash equilibria (in pure and in mixed strategies).

There are two firms, selling an identical, homogeneous good. They each choose their prices p_i simultaneously. The prices must be integers, with $1 \leq p_i \leq 4$. Each firm produces under constant returns to scale, with a unit cost of production of \$1 per unit. Customers all buy from the cheaper of the two firms ; if the two firms post the identical price, half the customers buy from each firm. Aggregate quantity demanded of the good is $Q = 4 - p$ where p is the lower of the firms' posted prices. Each firm sets its price non–cooperatively, seeking to maximize its profit.

continued

9. Write down the following game in extensive form, and find a subgame perfect Nash equilibrium to it.

The two players are the owner of a bankrupt ice cream stand, and the creditors. The ice cream stand has a stock of ice cream on hand, but the ice cream must be sold before its "best before date", which is three days away.

The owner and the creditors must have a signed agreement before they can sell any ice cream. If they have an agreement before day 1, the ice cream stand will be able to earn $5000 in net revenue before the ice cream spoils. If they do not reach an agreement until day 2, then the stand will earn only $4000 before the ice cream spoils. If they do not reach an agreement until day 3, then the stand will earn $3000. [And if they cannot reach an agreement by day 3, they will not get any revenue.]

On day 1, the stand's owner makes an offer (on how to split the sales revenue) to the creditors. If they accept this offer immediately, the stand can open on day 1. If they reject this offer, they can make a counter–offer, but the stand will not open on day 1. If the make a counter–offer, the owner can accept the counter–offer, and then the stand will open on day 2. But the owner can reject the counter–offer, in which case the stand will not open on day 2, but the owner will be able to make a final offer to the creditors. If the creditors accept the final offer, the stand will open for day 3, and if they reject the final offer, there will be no revenue from ice cream sales.

Each player's payoff is the money they get from ice cream sales.

10. What is the expected revenue from a first–price sealed bid auction (or from any other efficient auction) if there are two bidders, and each bidder's valuation of the object is an independent draw from the uniform distribution over $[0, 1]$?