

Econ 100B (Grossman)—Winter 2010
Final Exam—Version A
March 16, 2010

Instructions: This is a closed-book, closed-notes exam. No calculators or electronic devices are allowed. Please turn off and put away all phones and other electronic devices. There are 14 multiple-choice questions and two free-response questions. Answer as many as you can in the time allowed. If you get stuck on something, I suggest moving on and coming back later when/if you have time. If you have a question, please raise your hand. Good luck!

Multiple choice – 29 out of 50 pts. (14 qns., 2 pts. each + 1)

*Answer these questions on your Scantron. Your score will **only** be based on the marks on your Scantron. You will not receive any credit for anything written on your exam paper. You will receive 1 point for correctly writing (and bubbling in) your name, perm number, version (A,B,C, or D), and TA's name on your Scantron.*

1. In the competitive widget industry, the demand is $q = 100 - p$ and the supply is $q = p - 40$. What is the deadweight loss if the government imposes a tax of 20 per widget?
 - (a) 200
 - (b) 500
 - (c) 100
 - (d) 400

2. You have \$9 and preferences given by $u(w) = \sqrt{w}$. Which of the following options is most attractive?
 - (a) Get a free lottery ticket that has a 1 in 3 chance of winning \$91
 - (b) Pay \$5 for a lottery ticket that has a 50-50 chance of winning \$21
 - (c) Do nothing
 - (d) Pay all your money (\$9) for a lottery ticket that has a 1 in 4 chance of winning \$100

3. A monopolist faces inverse demand $p = 190 - 5q$ and zero costs. What is the profit-maximizing level of output?
 - (a) 29
 - (b) 10
 - (c) 19
 - (d) 9.50

4. Emmon is the sole supplier of Fanta in Santa Barbara. Inverse demand for Fanta is given by $p = 120 - 2q$ and each Fanta costs 20 to import. Because Emmon is psychic, he practices 1st degree (perfect) price discrimination. How much Fanta does he provide?
 - (a) 80 bottles
 - (b) 40 bottles
 - (c) 50 bottles
 - (d) 100 bottles

5. Two coffee shops compete as Cournot duopolists. The inverse demand for coffee is $p = 2 - Q$, where Q is total amount produced by the two shops. Each shop has the same cost function $c(q) = 2q^2$. What is *total* equilibrium output?
- $4/7$
 - $4/9$
 - $3/8$
 - $6/15$
6. An exchange economy has two consumers, named Jimmy and Sue, and two commodities, apples and bananas. Jimmy's initial endowment is 2 units of apples and 4 unit of bananas. Sue's initial endowment is 4 apples and 4 units of bananas. Jimmy's utility function over apples and bananas is $U(A_J, B_J) = A_J^{1/2} B_J^{1/2}$. Sue's utility function is of the form $U(A_S, B_S) = A_S + B_S$, where A_J and B_J are the amounts of apples and bananas for Jimmy and A_S and B_S are amounts of apples and bananas for Sue. The equation of the contract curve in terms of Jimmy's coordinates is
- $B_J = A_J$
 - $B_J = \frac{A_J}{2}$
 - $B_J = 2A_J$
 - $B_J = \frac{8A_J}{1+A_J}$
7. (*continued from the previous question*) In equilibrium, apples and bananas have the same price. Jimmy's consumption bundle must be
- 4 apples and 2 bananas
 - 2 apples and 4 bananas
 - 3 apples and 3 bananas
 - 4 apples and 4 bananas
8. Ariel produces aluminum cubes, facing costs of $C(A) = \frac{A^2}{10}$, where A is the number of cubes produced, and selling them on the competitive market for \$30. Bjorn grows beets next to Ariel's factory, facing costs of $C(B) = 5B + \frac{B^2}{100} + \frac{A^2}{20}$, where B is the number of beets produced, and selling them for \$15 on the competitive market. Because aluminum pollution is harmful to beet production, the town council decides to impose a tax on aluminum cubes. If the socially optimal production levels are $A^* = 100$ and $B^* = 500$, what is the tax (per aluminum cube) that would induce efficiency?
- \$30
 - \$15
 - \$10
 - \$25
9. Xavier makes xylophones next to Yasmin's yak farm. Xavier's profit function is $\pi_x(x) = 40x - x^2$ and Yasmin's profits function is $\pi_y(y) = 50y - y^2 - xy$. The loud noise from xylophone production interferes with the yak breeding. There is no law against making noise (i.e. Xavier has the right to make noise), so Yasmin offers to pay Xavier to cut back on his xylophone production. How many xylophones will Xavier end up making after this negotiation?
- 4
 - 10
 - 20
 - 15

10. The dollar value of fish caught from Lake Spooky is given by $f(b) = 100b - 5b^2$, where b is the number of fishing boats. Fishing boats are costless to buy and operate. What is the optimal tax that the Department of Fish Affairs should impose on fishing boats, so as to avoid the Tragedy of the Commons?
- (a) \$0 per boat
 - (b) \$50 per boat
 - (c) \$1 per boat
 - (d) \$100 per boat
11. Fortuna, California has 500 people. Every year a fireworks show is held. Each resident of Fortuna is willing to pay \$4 for fireworks. If the cost of providing the fireworks (f) is $c(f) = 2f^2$, what is the Pareto Efficient amount of fireworks?
- (a) 2000
 - (b) 1000
 - (c) 1500
 - (d) 500
12. Three people play the following game. Each person is given \$10 and must privately choose an amount x to contribute to the group 'pot'. The total money in the pot is doubled and distributed equally among all the people in the group. What is the Pareto efficient outcome?
- (a) Each person contributes $x = 0$
 - (b) Each person contributes $x = 3$
 - (c) Each person contributes $x = 10$
 - (d) Each person contributes $x = 5$
13. The town of Rexford is deciding whether to proceed with a public project. The only residents of the town have the following net valuations (including cost) of the project: $V_a = 60$, $V_b = 10$ and $V_c = -100$. If the town applies a VCG mechanism to make the decision, which of the following is true?
- (a) The project is abandoned and c pays a tax of 70
 - (b) The project is abandoned and no one pays any tax
 - (c) The project is abandoned and c pays a tax of 40
 - (d) The project is abandoned and a , b and c pay respective taxes of 40, 0, and 30
14. The city of Santa Barbara is thinking about doing some landscaping work on the start of the Jesusita trail, which burned last year. Homeowners A and B live next to the trailhead and 100 more people enjoy the use of the trail. A and B each have a net valuation of -40 for the project because it will increase traffic on their street. The project improves the hiking experience and each of the 100 trail users has a net valuation of 1. If the city applies a VCG mechanism, which of the following is true?
- (a) The project is approved and no one pays any tax
 - (b) The project is approved and each trail user pays a tax of \$0.80
 - (c) The project is approved and the homeowners are each given subsidies of \$40
 - (d) The project is not approved

Free-response – 21 out of 50 pts. (2 qns., 10 pts. each + 1)

Answer these questions in your blue-book. Show your work and intermediate steps for partial credit. If you cannot complete part of the problem, e.g. if you get stuck on some algebra, you may still earn partial credit for explaining intuitively how you would solve if you were not stuck. You can expect to see fractions in your answers. Your score will **only** be based on the marks in your blue-book. You will not receive any credit for anything written on your exam paper. You will receive 1 point for correctly writing your name, perm number, version (A,B,C, or D), and TA's name on your blue-book.

1. Consider an exchange economy consisting of two people, A and B , endowed with two goods, 1 and 2. Each person is initially endowed with 5 of each good. Their preferences are given by $U^A(x_1, x_2) = x_1^2 x_2$ and $U^B(x_1, x_2) = x_1 x_2^2$. This question asks you to assume that $p_2 = 1$, then find the competitive equilibrium allocations and p_1 . (Points split equally across parts)
 - (a) Find the MRS for each consumer
 - (b) Write the equation of the contract curve (express x_2^A as a function of x_1^A)
 - (c) Write the equation of the budget constraint (in person A 's coordinates) as a function of p_1
 - (d) What expression involving x_1^A and x_2^A can we substitute for p_1 in your answer to the previous part?
 - (e) Find the competitive equilibrium price, p_1 and allocations, $x^A = (x_1^A, x_2^A)$ and $x^B = (x_1^B, x_2^B)$
2. A bakery and coffee shop operate next to each other downtown. The bakery sells bags of donuts (d) for \$30 each and the coffee shop sells bags of coffee (k) for \$15. Making donuts and coffee is costless, but each shop needs to advertise to attract customers. Some of the customers lured by the advertising from one shop will also make a purchase at the other shop. Specifically, the bakery needs to spend $c(d) = \frac{d^2}{15} - \frac{dk}{30}$ on advertising in order to sell d donuts and the coffee shop must spend $c(k) = \frac{k^2}{15} - \frac{dk}{30}$ on advertising in order to sell k cups of coffee.
 - (a) (2 points) What is the bakery's marginal private benefit of selling a bag of donuts and the marginal private cost? What is the coffee shop's marginal private benefit of selling a bag of coffee and the marginal private cost?
 - (b) (2 points) How many bags of donuts and coffee will be sold in the competitive marketplace?
 - (c) (2 points) The city looks out for its business owners and hires a consultant to determine how much the two shops should advertise in order to maximize total profits. What level of d and k does the consultant recommend?
 - (d) (4 points) The city decides to subsidize d and k so as to induce the owners to choose the amounts recommended by the consultant. What should be the subsidy per bag of donuts, s_d , and the subsidy per bag of coffee, s_k ?