

Economics 479 - Fall 2003  
Professor Yelowitz  
Final Exam - 12/18/2003

Name \_\_\_\_\_  
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This quiz is worth 25 points. You have 120 minutes. There are 7 questions (25 parts) altogether.

1. Jane's utility function is  $U(L, C)$ , where L stands for leisure and C stands for consumption goods. Jane is endowed with 300 hours of leisure per month. The price of consumption goods is \$1. Jane's wage rate is \$5 per hour.

1a. If Jane's preferences were represented by  $U(L, C) = L^{\frac{5}{4}} C^{\frac{3}{5}}$ , how many hours would she work in the absence of the welfare system?

1b. If the state offered a cash welfare grant of \$800, and taxed it at 0 percent, how many hours would Jane work?

For the remainder of the problem, *disregard the utility function given in part a.*

Assume Jane lives in a state that offers cash assistance through the AFDC program. The maximum benefit from this program is \$100 per month. Earnings in the amount of \$100 per month is allowed through a standard deduction before AFDC cash benefits begin to be reduced at a tax rate of 50 percent. The state also offers Medicaid coverage valued at \$200 per month while Jane is on cash welfare, and takes Medicaid away completely when she is off cash welfare.

1c. Draw the budget constraint facing Jane, clearly labeling the axes, intercepts and any kink points. Is there any range of hours which Jane will definitely not work? If so, what is this range?

1d. What predictions can be made about cash welfare participation, labor force participation, and hours of work when the government offers Medicaid coverage?

2. As a by-product of its production, a perfectly-competitive steel firm dumps pollution into a river that harms a fisherman downstream. The demand curve facing the firm is:  $P = 27 - \frac{1}{2}Q$ . The fishery's total external cost is:  $TEC = Q^2 + 4Q$ . The marginal social cost is:  $MSC = 5 + 2Q$ .

2a. Calculate the socially optimal level of steel production,  $Q_{\text{SOCIAL}}$ .

2b. Calculate the per-unit pigouvian tax that would achieve  $Q_{\text{SOCIAL}}$ .

2c. Calculate the deadweight loss if the steel firm ignored that fact that it produces an externality.

2d. In this example, what is the largest bribe that the fishery is willing to give to the steel firm to move from  $Q_{\text{PRIVATE}}$  to  $Q_{\text{SOCIAL}}$ ?

3. Sidney bakes blueberry pies which she sells in a perfectly competitive market facing an inverse demand curve:  $P = 40 - Q$ . Her marginal costs of producing pies are given by:  $MC = 7Q$ . Sidney has two next door neighbors. Her neighbor, Michael, likes the smell of the pies. His marginal external benefit is given by:  $MEB = 50 - \frac{5}{4}Q$ . Her other neighbor, Jane, does not like the smell of the pies. Jane's marginal external cost is given by:  $MEC = 3Q$ .

3a. What quantity of pies would Sidney produce on her own, what quantity would Michael prefer the most, what quantity would Jane prefer the most?

3b. Calculate the deadweight loss from the private market providing pies.

4. Assume that fireworks are a public good. Allison, Billy, and Carlos have the following individual demand curves for fireworks.  $P_A = 200 - Q_A$ ,  $P_B = 110 - Q_B$ , and  $P_C = 100 - Q_C$ , where  $Q_A$ ,  $Q_B$ , and  $Q_C$  represent the amount of fireworks consumed by Allison, Billy, and Carlos respectively. The marginal cost of producing fireworks is given by:  $MC = 8Q$ .

4a. Calculate the socially optimal quantity of fireworks.

4b. If Allison alone provided the public good, what would be the deadweight loss to society?

4c. If Allison did, in fact, provide her optimal quantity, would Billy or Carlos have an incentive to contribute for the public good?

4d. What would be the socially optimal quantity if the total cost function were instead given by:

$$TC = \frac{1}{300} Q^2 ?$$

5. Suppose that two people, Jerry and George, live on an island where there are two goods, food and clothing. The utility functions for Jerry and George are expressed as:

$$U_J = \min\{2F, C\}$$

$$U_G = 4F + 3C$$

The total amount of food on the island is  $F = 100$ , while the total amount of clothing is  $C = 200$ . The initial allocation of the goods is:

$$F_J = 60, C_J = 80$$

$$F_G = 40, C_G = 120$$

Assume that the economy is perfectly competitive, and that Jerry and George can trade with each other.

5a. What allocation of food and clothing does Jerry end up with after trading?

5b. What allocation of food and clothing does George end up with after trading?

6. Evaluate the following statements.

6a. How does the tax system provide incentives to offer employees compensation in the form of fringe benefits such as health insurance?

6b. (True/False, explain) The reason you would not want to put state bonds into a Roth IRA is that the returns on state bonds are lower than the returns in the stock market.

6c. If you are in the 27% tax bracket, a \$1000 charitable contribution in cash always lowers your tax bill by \$1000.

6d. The tax deductibility of mortgage interest always lowers the cost of owning a home.

7. In the questions below, assume that the rate of return in the stock market is 10% if a portfolio is actively managed, and is 7% if passively managed. Also assume that the investment is held for 30 years, the income tax rate is 25% during the working life and 15% during retirement, and the tax rate on capital gains is 20%.

The amount you are potentially investing comes from a \$1 bonus from your employer.

To get credit below, please ***completely*** show your work, equations, etc.

7a. Assume the money is invested in a non-tax-deferred account and capital gains are realized each year. How much would the investment be worth after 30 years?

7b. Assume the money is invested in a non-tax-deferred account and capital gains are realized only at the end of the investment. How much would the investment be worth after 30 years?

7c. Assume the money is invested in a Roth IRA. How much would the investment be worth after 30 years?

7d. Assume the money is invested in a traditional IRA. How much would the investment be worth after 30 years?

7e. Assume there were no taxes at all. How much would the investment be worth after 30 years?