

Economics 479 - Spring 2003
Professor Yelowitz
Final Exam - 05/07/2003

Name _____

Student ID _____

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 \$2. Jane's wage rate is \$10 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 assistance through the AFDC program. The maximum benefit from this program is \$100 per month. Earnings in the amount of \$200 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 \$100 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 steel firm's total cost of production is: $TC = Q^2 + 4Q$. The marginal social cost is: $MSC = 5 + 2Q$.

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

2b. Calculate the per-unit pigouvian tax that would achieve Q_{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_{PRIVATE} to Q_{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: $MC = 5Q$. 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: $MEC = 5Q$.

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:

$$TC = \frac{1}{200} Q^2 ?$$

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 all cases below, assume that the rate of return in the stock market is 10%, regardless of whether the portfolio is actively or passively managed. Also assume that the investment is held for 40 years, income tax rates are 27% (and unchanging), and the tax rate on capital gains is 20%.

7a. Assume \$1 is invested and capital gains are realized each year and treated as ordinary income. How much would the investment be worth after 40 years?

7b. Assume \$1 is invested and capital gains are realized only at the end of the investment (e.g., “buy-and-hold”), and are taxed as capital gains. How much would the investment be worth after 40 years?

7c. Assume \$1 is invested in a Roth IRA. How much would the investment be worth after 40 years?

7d. Assume \$1 is invested in a 401(k) with a match rate of 75%, and with the tax savings invested in housing earning a return of 5%. How much would the investment be worth after 40 years?

7e. Assume \$1 is invested in a 401(k), and with the tax savings invested in housing earning a return of 5%. How much would the investment be worth after 40 years?