

Economics 441 Practice Midterm Questions

The following practice exam is intended as an indication of the general topic content and level of difficulty of the actual exam. The actual exam, however, will also include point values for all questions and will provide assistance for any very complicated calculations.

True, false, uncertain; explain. State whether each of the following statements is true, false or uncertain (by which we mean the answer is ambiguous, under some circumstances it may be true and under others it may be false), and explain your answer. If a word or phrase is underlined, you must provide its definition in your answer.

1. 5 players are involved in a public goods experiment. Each receives \$5 at the start of the experiment. Players can contribute none, some or all of their \$5. Contributed dollars are multiplied by 5.5 before being added to the common pot. At the end of the experiment, the common pot is divided equally among all players.

Each player's individual payoff-maximizing contribution is \$0.

2. Table 1.1 in your text states that in 1960 the total federal, state and local expenditures in the US were \$123 billion 1960 dollars. In 2005, the expenditures were \$3876 billion 2005 dollars. The US government, therefore, has grown to more than 30 times its 1960 size.

3. The Second Fundamental Theorem of Welfare Economics states that when (1) all producers & consumers act as perfect competitors and (2) a market exists for every commodity then a Pareto efficient allocation of goods will emerge from an unfettered market.

4. The social cost of pollution in Whoville is a constant \$1000 per unit, where e represents emissions units. The two factories polluting Whoville with their emissions from production are Nu's aluminum factory and Auld's smelting. Nu's costs of emissions abatement level e are $C_N(e) = 5e^2$. Auld's costs of emissions reduction e are

$C_A(e) = \frac{10}{3}e^3$. A command and control policy in which Nu's must abate 100 units and

Auld's must abate 30 units is both socially efficient and fair.

5. At the efficient level of consumption of a pure public good, the MRS between the good and the relevant alternative is the same for everyone consuming the good.

6. Three things must hold for us to accept (actually, not to reject) the claim that X causes Y:

I. X precedes Y

II. X and Y are correlated

III. Information on X is all we need to determine Y.

Essays

I. Karl and Sasha operate factories along a lake. Karl produces output X . He has standard linear demand and supply curves, and produces at private profit-maximizing level X_p . In the process, he pollutes the lake, which increases production costs for Sasha. Assume that no one owns the property rights to the lake. Assume further that total damages for Sasha are $\$X$ when Karl produces X units.

(a) Draw a graph that depicts the situation.

(b) Show the amount Karl produces on his own, X_p , and the amount that's efficient for society. Label the efficient amount X^* . How are they related, and why?

(c) Suppose that we assign ownership of the stream to Karl. What is his equilibrium private output now? Why?

(d) Suppose we assign ownership of the stream to Sasha. What is Karl's equilibrium private output in this case? Why?

(e) Suppose instead of assigning property rights to the stream, the government decides to fix the pollution problem through tax and subsidy policy. Give an example of a tax or subsidy that will lead to the socially efficient level of X . How big should the tax or subsidy be?

II. The superhero profession is a dangerous business. Every year, in fact, there's a probability p that a given superhero will be caught by a ruthless supervillain, who inflicts damage that requires $\$50$ in medical costs to heal. Being a superhero doesn't pay well, but fortunately, superheroes receive an annual income of $\$100$ from their (covert) civilian job. They first spend money on any medical costs, and use the rest for consumption.

In one particular metropolis, there are two types of superheroes: clumsy and skillful. Clumsy superheroes have a 90% probability of being caught by a supervillain and suffering $\$50$ in medical costs. Skillful superheroes, on the other hand, are only caught with probability 30%. Additionally, these two types have different utility functions. The utility of consumption for clumsy superheroes is $U_{clumsy} = (C_{clumsy})^7$ while the utility of consumption for skillful superheroes is $U_{skillful} = (C_{skillful})^5$. Fortunately for this metropolis, there are eleven times as many skillful superheroes as clumsy superheroes.

ACME Insurance Company has moved in to the city, and is thinking about offering health insurance to superheroes.

- a) If ACME can perfectly identify whether each superhero is skillful or clumsy, then it can charge a different premium to each type. Suppose it charges an actuarially fair price for insurance. How much will ACME charge each type for full insurance? After paying the premium, how much will each type have for

consumption if they get caught, and how much will they have if they don't get caught?

- b) Now suppose that the type of the superhero is unobservable by the insurance company (although the superheroes themselves know), so ACME can only offer a single price for insurance.
- (i) What is the maximum amount of money each type will pay in order to be fully insured against medical costs? Explain why this amount is the same or is different from the costs of actuarially fair insurance.
 - (ii) Given this, what is the maximum amount that ACME can charge such that *all* types will fully insure? Will ACME stay in business if it does this? Is there a market failure in the insurance market – why or why not?