Midterm Economics Exam (Makeup) **Answer Key**

I. Definitions (7 points each) Briefly define each of the following terms.

market welfare hypothesis

It states that (1) if the supply curve represents the marginal social cost of supplying a good, (2) if the demand curve represents the marginal social benefit supplied by this good, and (3) if there is a single equilibrium, then the market equilibrium is also the price and quantity that maximize the net benefits to society to be had from this good. Notes: (1) The third condition is more technical and is not necessary for full credit. (2) The MWH is not about whether there will be an equilibrium, but whether the equilibrium (a "positive" phenomenon) will be beneficial (a "normative" characteristic).

safety standard

Under this standard the permissible level of pollution is set to safeguard the rights of people to enjoy a safe and healthy environment, to the extent that this is economically feasible. It differs from the efficiency standard, which gives equal weight to the harm caused by pollution and the cost of reducing it.

willingness to pay

*This is the **maximum** amount an individual would be willing to spend on a good or service — generally in excess of the price actually charged. It is depicted by the height of the demand curve for a particular purchase. It is the most common basis for measuring the marginal social benefit of goods and services.*

II. Short-answer questions (15 points each) For two of the following three statements, indicate whether they are true or false and briefly explain why.

1. Because it is illegal as well as harmful to users, there can be no equilibrium in the market for cocaine.

*False. The harm and illegality of cocaine have not prevented the emergence of a market. There are buyers and sellers, and it is quite possible that there is a potential equilibrium. Note: it is not **guaranteed** that there will be such an equilibrium.*

2. The carbon compounds released from the tailpipe of an automobile provide an example of an externality.

True. Although a small portion of the harm caused by these compounds is experienced by the driver who buys the gas, nearly all of it is imposed (through its effect on the climate system) on others, who are not able to demand compensation. Thus the costs are external to the decision-makers, the manufacturers and consumers.

3. Congress is currently debating whether airport security should be funded privately by air travel companies or publicly by the federal government, but this has little or no bearing on the social cost of this security (as that term is understood by economists).

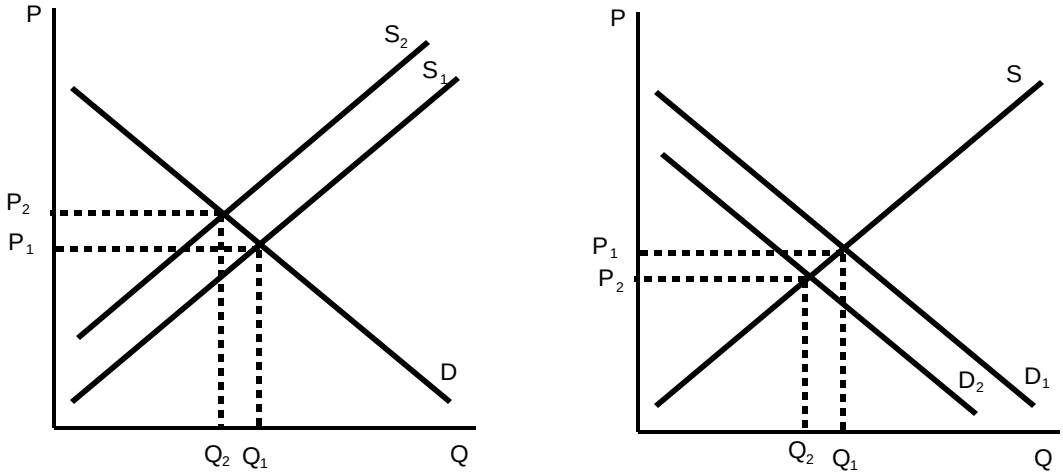
True. The social cost consists primarily of the opportunity cost of the time spent by security personnel, the value of this time in its best alternative uses. To a limited extent it may also include the unpleasantness of the job (potential risk, boredom, etc.). These will be largely the same whether the workers are paid by the federal government or the private sector. (There is also an opportunity cost associated with the time spent by passengers waiting in line, but this clearly has no relation to who foots the bill for security.)

III. Problems Solve all of the following numerical and graphical problems.

1. (10 points) Draw a diagram for the market in Weyerhauser's raw logs , incorporating "normal" supply and demand curves, and indicate the equilibrium price and quantity of these logs. Now, for both of the following, shift either the demand curve or the supply curve in the correct direction and show how this changes the equilibrium price and quantity. Show and label the old and new curves, and the old and new equilibria, in the same diagram.

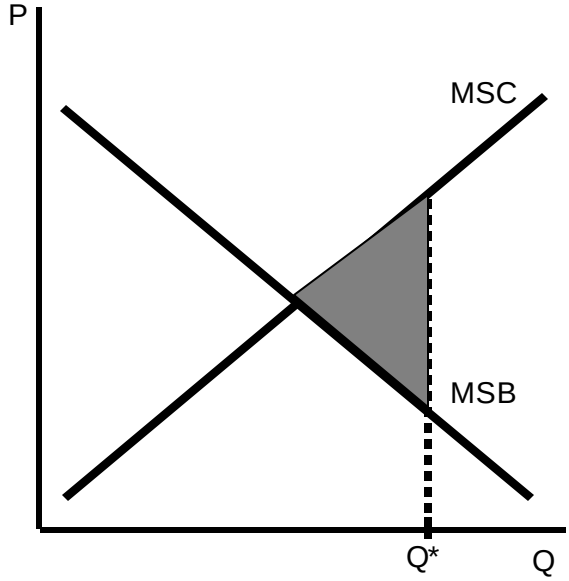
a. A disease decimates Weyerhauser's timber stands.

b. As part of a trade agreement, the United States lifts all restrictions on the import of raw logs.



a. b.

2. (10 points) Suppose the following diagram represents the marginal social cost (MSC) and marginal social benefit (MSB) of old growth timber products. If the quantity actually produced and purchased is Q*, shade in the area representing the net **costs** to society of this excessive amount (i.e. the reduction in net benefits compared to the optimal amount).



3. (28 points) A brewery operates along a river that flows through a small city, producing beer that earns $10M per year. It has a choice of five different production processes, each with a different cost of production and impact on the local water quality. The following table gives the production cost and resulting water treatment cost for each process. We assume in this problem that the water treatment cost represents the entire effect of the brewery's pollution on the city.

Process #	beer production cost	water treatment cost
1	$4M	$2M
2	$4.2M	$1.2M
3	$4.6M	$0.6M
4	$5.4M	$0.2M
5	$6.4M	$0

a. What is the economically efficient production process? How do you know? (Note: this is the basis for all future questions, so double-check your answer.)
#3. The combine cost (production plus water treatment) is at its lowest ($5.2M).

b. What is the marginal cost to the brewery of going to the efficient production process (as determined above) from the one that pollutes a little more?
$0.4M (from $4.2M to $4.6M)

c. What is the total cost of pollution control to the brewery when it uses the efficient process?
$0.6M (from $4M to $4.6M)

d. What is the marginal benefit to the city of having the brewery move to the most efficient process from the one that pollutes a little more?
$0.6M (from $1.2M to $0.6M)

e. What is the most the city is willing to pay to have the brewery adopt the efficient process rather than #1?
$1.4M ($2M – $0.6M)

f. What is the least the brewery would be willing to accept as compensation for producing with the efficient process rather than #1?
$0.6M ($4.6M – $4M)

g. What is the most the brewery would be willing to pay for the opportunity to produce with the efficient process rather than #5?
$1.8M ($6.4M – $4.6M)

h. What is the least the city would be willing to accept as compensation for permitting the brewery to produce with the efficient process rather than #5?
$0.6M ($0.6M – $0)

i. Are your answers to (a) and (e) through (h) consistent with the Coase Theorem? Explain.
Yes. If the brewery has the right to pollute, the city will be willing to pay more to get to process #3 ($1.4M) than brewery needs to receive ($0.6M). If the city has the right to prevent all pollution, the brewery will be willing to pay more to get to process #3 ($1.8M) than the city needs to receive ($0.6M). Since the Coase Theorem says that, with clear delineation of property rights and sufficiently low transaction costs the parties will arrive at the same, efficient outcome no matter who has the rights, it is consistent with this example.