Name:

Section:

Date assigned: Thursday, 9/4 Date due: Thursday, 9/11

# Instructions:

- This problem set has 6 questions, for a total of 35 points. The number of points for each question is indicated at the start of the question.
- Please solve the questions on separate pieces of paper that are to be turned in with your name written on top, **stapled**.

# 1: 3 points for each subquestion, 5 subquestions (15 points total)

For each of the examples below, please answer the following:

- 1. Does an externality exist? If so, classify the externality as positive/negative (or both).
- 2. If an externality exists, determine whether the Coase Theorem applies (i.e. is it possible to assign property rights and solve the problem?)
- 3. If an externality exists and the Coase Theorem does not apply, argue which of the government's tools are best suited to address the issue: quantity regulation, taxes/subsidies, tradable permits, or something else.

Consider the following examples.

- 1. British Petroleum drills for oil in the gulf coast.
- 2. Carbon emissions for vehicles.
- 3. Your upstairs neighbors throwing an awesome, but loud party.
- 4. Buying a car with added safety features that prevent the drivers/passengers' deaths in the event of an accident.
- 5. Bringing crying babies on a plane.

## 2: (3 points total)

Suppose that a firm's marginal production costs are given by

MC = 10 + 3Q

The firm's production process generates a toxic waste, which imposes an increasingly large cost on the residents of the town where it operates: the marginal external cost (i.e. marginal cost inflicted on the residents) associated with the Qth unit of production is given by 6Q. What is the marginal private cost

associated with the 10th unit produced? What is the total marginal cost to society associated with producing the 10th unit (the marginal social cost of the 10th unit)?

#### **3:** (3 points total)

In two-car automobile accidents, passengers in the larger vehicle are significantly more likely to survive than are passengers in the smaller vehicle. In fact, death probabilities are decreasing in the size of the vehicle you are driving, and death probabilities are increasing in the size of the vehicle you collide with. Some politicians and lobbyists have argued that this provides a rationale for encouraging the sale of larger vehicles and discouraging legislation that would induce automobile manufacturers to make smaller cars. Critically examine this argument using the concept of externalities.

# 4: (4 points total)

Davidsonia has two regions, Chambersland and Preyerland. In Chamberland, the marginal benefit associated with pollution cleanup is

$$MB = 300 - 10Q$$

while in Preyerland, the marginal benefit associated with pollution cleanup is

$$MB = 200 - 4Q$$

Suppose that the marginal cost of cleanup is constant at \$12 per unit. What is the optimal level of pollution cleanup in each of the two regions?

### 5: (5 points total)

The private marginal benefit associated with a product's consumption is

$$PMB = 360 - 4Q$$

and the private marginal cost associated with its production is

$$PMC = 6Q$$

Furthermore, the marginal (external) damage associated with this good's production is

$$MD = 2Q$$

To correct the externality, the government decides to impose a tax of T per unit sold. What tax T should it set to achieve the social optimum?

#### 6: (5 points total)

Suppose that demand for a product is

Q = 1,200 - 4P

and supply is

Q = -200 + 2P

Furthermore, suppose that the marginal external damage of this product is \$8 per unit. How many more units of this product will the free market produce than is socially optimal? Calculate the deadweight loss associated with the externality.