PROBLEM SET 3

1. Give two examples of positive externalities and two examples of negative externalities that were not mentioned in class.

2. Why do externalities generate an inefficient outcome?

3. How do taxes and subsidies solve the problem of externalities?

4. What is the potential danger of implementing taxes and subsidies when you know that an externality is being generated but you don’t know its magnitude?

5. Do Mexican immigrants impose a negative externality on low-skill American workers? Do they impose a positive externality on Mexican workers who stayed in Mexico? Explain.

6. Do children who cry during flights impose negative externalities on other passengers? Explain.

7. Suppose the supply curve of boom box rentals is given by \( P = 5 + 0.1Q \), where \( P \) is the daily rent per unit in dollars and \( Q \) is the volume of units rented in hundreds per day. The demand curve for boom boxes is \( P = 20 - 0.2Q \). If each boom box imposes $3 per day in noise costs on others, by how much ill the equilibrium number of boom boxes rented exceed the socially optimal number? Calculate the deadweight loss. How would the imposition of a $3 tax per unit affect efficiency in this market?

8. The benefit that a smoker receives from each cigarette is given by the equation \( MB = 20 - 2Q \), where \( MB \) is the smoker’s marginal benefit and \( Q \) is the number of cigarettes she smokes. By adding the price of a cigarette, opportunity costs, and the health costs associated with cigarettes, the marginal cost to the smoker of smoking a cigarette is given by the equation \( MC = 2Q \). The smoker, however, does not realize that each cigarette she smokes generates a cost of $4 to all the people around her, either because the smoke is bothering them or because passive smoking raises the chances of getting lung cancer. Based on this information, answer the following questions:
   a) How many cigarettes will she smoke?
   b) What is the socially optimal number of cigarettes that she should smoke?
   c) From society’s point of view, is this person smoking too much, the right amount, or too little? Why?
   d) If you think there is a problem to be solved, how would you solve it?
   e) Is it possible to achieve the socially efficient outcome by introducing a substance in cigarettes that reduces the benefit of smoking each cigarette? Specifically, assume that this substance reduces the marginal benefit by $4 per cigarette. How many cigarettes will the person smoke? What is the socially efficient number of cigarettes that she should smoke? What do you conclude?
9. A firm is interviewing recent college graduates for a position. There are two types of positions: good and bad. If you are hired to work in the good job, you will be paid $100,000. If you are hired to work in the bad job, you will be paid $60,000. Obviously, the firm wants to assign talented people to good jobs and untalented people to bad jobs. The problem is that by just interviewing the candidates, the firm cannot tell who is talented and who is not. The candidates know their skills, but of course they will always say that they are talented. The only thing the firm knows is that it is easier for a talented person to do well in a hard course than it is for an untalented person. Specifically, assume that the opportunity cost of taking a hard course for the talented person is always half the cost of taking the same class for the untalented person.

a) If firms are requiring 10 hard courses, and colleges choose how hard each class is, then what must be the cost of taking each class for the untalented students so that we see the full separation of types?

10. Give two examples of adverse selection that were not mentioned in class.

11. Give two examples of signaling and two examples of screening that were not mentioned in class.

12. Why do you think people prefer to give gifts in kind instead of cash? Clearly the person who received the in-kind gift could have bought the same thing if he had received the money instead.

13. In most labor markets, firms prefer to hire single women rather than married women (married women are more likely to have children and therefore will probably miss more days of work). A law was passed prohibiting firms to ask about marital status during interviews. Why has this law been ineffective?

14. Why are warranties credible signals of quality?

15. If part of the value of a college education is the signal that it sends to potential employers, discuss the optimal level of difficulty of classes. How hard should college be? And with respect to professors, is it better to have professors who explain the material well or professors who don’t?

16. Give two examples of moral hazard that were not mentioned in class.

17. An employer wants to hire a worker to work on a specific project. The worker’s utility depends on the wage he receives from the employer (w) and the effort he puts in this project (e):

\[ U = w - c \]

Only two levels of effort are possible: low and high. A high level of effort has a cost of $10. There is no cost to performing a low level of effort.
If the worker provides low effort, the project will be successful with a 20% probability. If the worker chooses high effort, the project will have a 60% chance of being successful. If the project is successful, the employer receives revenue of 30. If the project is not successful, no revenue is generated. The employer cannot monitor effort directly, so he must provide the right effort incentives to the worker. The employer’s objective is to maximize profit:

Suppose that the worker can get a job somewhere else that pays a wage of 8 and requires low effort.

   a) Write down the incentive compatibility constraint.
   b) Write down the participation constrain.
   c) Write down the employer’s participation constraint.
   d) Show all the feasible contracts on a graph.
   e) If the worker has all the bargaining power, what is the contract that will be offered to him?