ECON 331: Environmental Economics

Homework 1

- Define any variables you need to answer the problems.

- Use any materials to help you with these questions. That includes others in this course!

- Please write your answers in the space provided.

- Keep your answers short but clear. Your goal is to convince a skeptical grader that you understand the relevant concepts well enough to answer the question you are given.

- The questions on this homework sum to 81 points. But you get a 100 for completing/attempting the majority of the questions.

- Remember to write down the names of anyone you worked with on this homework!

- Bring any and all questions to office hours!

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1. (4 points) What is your name?

2. (4 points) Who did you work with on this homework?

1 True/False Questions

Indicate "T"rue or "F"alse for each of the following statements or claims. For each false statement, if you explain why it is false I will give you a bonus point.

3. (2 points) The used car market is notorious for its information asymmetry. That is to say the seller of the used car knows much more about the quality of a used car than the buyer. **Claim**: Based on what we have learned in class, we would expect that the competitive equilibrium of this market is Pareto Optimal.

4. (2 points) Suppose on a given street one homeowner decides not to mow their lawn, and so their front lawn looks untidy. Bill also lives on this street and is trying to sell his house. He values the house at $150,000. He doesn't like that a neighbor does not mow their lawn, but Bill is able to sell his house for the full $150,000. **Claim**: Bill's neighbor not mowing their lawn is a negative externality on Bill.

5. (2 points) Suppose my neighbor likes to host loud parties on Friday nights, which makes me lose sleep. I value that lost sleep at $40 per Friday night, and my neighbor values the benefit of hosting those parties at $60 per Friday night. **Claim**: The social-welfare maximizing outcome, based on what we have learned in class, is for my neighbor to continue hosting the loud Friday night parties.

6. (2 points) A major difference between Pigouvian Taxes and the Coase Theorem is that Pigouvian Taxes will always target the party(ies) causing the externality, whereas under the Coase Theorem those affected by the externality may end up paying the those causing the externality.

7. (2 points) Suppose the United States wants to add a per-unit tax on cars from other countries. This tax is a producer tax placed on the seller of the car. **Claim**: If the tax were placed on the buyer of the car rather than the seller, the price of the car after the tax would be the same as if the tax was placed on the seller of the car.

2 Multiple Choice Questions

Circle the best answer to each question. There is only one answer for each question. No explanation necessary.

8. (2 points) Anushka lives in an apartment building, and a pizza shop opens next to her apartment building. Which of the following, if true, would represent a positive externality of the pizza shop opening for Anushka?

    A. The pizza shop is now closer and makes it easier for Anushka to buy pizza.

    B. The pizza shop is well lit, making it safer for Anushka to walk around her apartment building at night.

    C. Anushka is now able to smell pizza in her apartment when she opens the window.

    D. Anushka has the option to get a part-time job at the new pizza shop and it's close to her.

9. (2 points) Maria used to drive herself to campus everyday. Then she read peer-reviewed articles regarding the impact of car emissions on the environment and decided to start taking the bus or carpooling to campus to reduce her emissions. Let's imagine Maria's miles driven to and from campus in a supply-demand framework. After reading the research, Maria realized that the marginal social cost of driving to campus was _____ than the marginal private cost] of driving to campus. Setting marginal social cost equal to marginal private benefit _____ Maria's quantity of miles driven.

    A. higher, reduced.

    B. higher, increased.

    C. lower, reduced.

    D. lower, increased.

10. (2 points) Yi likes Starbucks and loves PSLs. PSLs come in one size. Each day Yi is willing to pay up to $12 for the first PSL, $10 for the second PSL, $8 for the third PSL, and $6 for the fourth PSL. Suppose when the price of a Starbucks pumpkin spiced latte (PSL) is $8, Yi buys 2 PSLs per day. When Starbucks has a sale on PSLs and sells PSLs for $6 for each PSL, Yi buys 3 PSLs per day. Which option correctly calculates the change in Yi's consumer surplus after Starbucks puts their PSLs on sale?

    A. $12.

    B. $8.

    C. $6.

    D. $4

11. (2 points) Suppose the market for a vanilla ice cream cone in the Binghamton area is perfectly competitive and consumers and producers of vanilla ice cream cones are equally responsive to changes in price. Suppose the government is considering adding a per-unit tax to the ice cream market. Which of the below is true if the government implements a $2 per-unit tax versus a $1 per-unit tax.

    A. The deadweight loss from a $2 per unit tax will be 0.5x as large as the deadweight loss from a $1 per-unit tax.

    B. The deadweight loss from a $2 per unit tax will be 1x as large as the deadweight loss from a $1 per-unit tax.

    C. The deadweight loss from a $2 per unit tax will be 2x as large as the deadweight loss from a $1 per-unit tax.

    D. The deadweight loss from a $2 per unit tax will be 4x as large as the deadweight loss from a $1 per-unit tax.

12. (2 points) Assume that demand for lemonade is seasonal, and increases in the summer months and decreases in the winter months. Also assume that the change in demand from winter to summer and summer to winter happens in a single instant. During the switch from winter to summer, the _____ would shift and we move along the _____.

    A. supply curve, demand curve.

    B. demand curve, supply curve.

    C. demand curve, both curves.

    D. supply curve, both curves.

3   Short Answer Questions

These questions all require an explanation. Remember you are trying to convince me you understand the why and the how of what you are doing, not simply getting the answer correct. Cite specific concepts from class in your answers for full credit.

13. **Tariffs & International Trade**. Suppose you are asked to predict the impacts of a new tariff on steel on domestic consumers and producers. A tariff is a tax added to each ton of imported steel. You have figured out that domestic demand for steel is given by $Q^D(P) = 1500 - 10P$. Suppose that there are 100 identical steel plants, and each steel plant has a supply curve given by $P = 2q_i + 30$ where q_i indicates the quantity supplied by a single steel plant. Suppose the steel market is perfectly competitive.

    (a) (2 points) Using the individual steel plant supply curves, derive the aggregate supply curve.

    (b) (6 points) Draw a supply and demand diagram using the aggregate demand and supply curves. Show the equilibrium price and quantity on your diagram.

(c) (3 points) Suppose that the world price of steel is the same as the equilibrium price you found in part c. How much steel would this country import?

(d) (4 points) Suppose instead the world price was $40 per ton of steel. On your supply-demand graph, show this new world price line and show the amount of steel this country would export or import. Explain.

(e) (2 points) Suppose instead the world price was $60 per ton of steel. How would your answer to part g change? A graph is optional a verbal explanation is sufficient.

(f) (3 points) Suppose the goal of the tariff is to make the country's steel trade deficit exactly equal to 0 when the world price of steel is $40. That is to say the country does not export or import any steel. How much would that tariff be?

(g) (12 points) On a new supply and demand diagram, again show the aggregate demand and aggregate supply curves and world price line of $40. Now show the tariff on the graph. Using the graph, explain the benefits and costs of the tariff on the country and provide guidance as to whether or not you think the tariff should be implemented based on the principles of welfare we have learned in class.

14. **Pollution Permits, Taxes, and More!**. Making the paper you write your notes on, and on which this homework is printed, produces air pollution and also a terrible smell ("aroma pollution") in the surrounding area. Suppose the marginal private benefit of paper, equal to the marginal social benefit of paper, is given by $MPB = MSB = 100 - 10Q$, where Q is measured as tons of paper produced. The marginal private cost of paper is given by $MPC = 10Q$. The marginal external cost of this plant due to the air pollution MEC_a is given by $MEC_a = 5 + 10Q$. The marginal external cost of this plant due to smell pollution MEC_s is given by $MEC_s = 5 + 5Q$.

   (a) (2 points) Derive the Marginal Social Cost (MSC) function for paper.

(b) (9 points) Let's begin by showing the competitive equilibrium and socially/Pareto optimal amount of paper in this market. On a graph below, graph three lines, one each for the MPB, MPC, and MSC you derived in part a. Then, indicate i) the competitive equilibrium in this market using X^* and ii) the Pareto Optimal point using X^{PO}. If you wish, you may indicate the equilibrium quantity and price with Q^*, P^* and the Pareto Optimal price and quantity with Q^{PO}, P^{PO}. Be sure to label your axes!

(c) (4 points) Algebraically determine X^* and X^{PO}. Show your work.

(d) (4 points) Now let's suppose we want to use a tax to push the market from X^*

to X^{PO}. Find the optimal tax level such that . Show your work and explain why your answer makes economic sense.

(e) (2 points) Suppose instead of a tax the government issued permits where 1 permit let a paper mill produce 1 ton of paper. How many permits would the government issue? Explain