

Homework 6
Principles of Economics
Prof. Sarah West
30 points

1. **(6 points)** Consider two oligopolies' payoff matrix below. The payoffs are profits, given in parentheses. The figure on the left refers to the profit to Firm A, the figure on the right to the profit to Firm B.

		Firm B	
		Price High	Price Low
Firm A	Price High	(15, 15)	(2, 25)
	Price Low	(25, 2)	(5, 5)

- a. What is the Nash equilibrium in this game? Explain.
 - b. Would the results of this game be different if it were to be played over and over again? Use evidence on OPEC to answer this question.
 - c. Do oligopolies behave more like monopolies or perfectly competitive firms? Use the results from your analysis above and real-world evidence in your answer.
2. **(6 points)**
- a. Give one example of a positive externality and one of a negative externality that people are exposed to on Macalester's campus. For each example, explain (point out) which decision makers are not internalizing the effects they are having on others.
 - b. How might each of these externalities be internalized? That is, how might the decision makers be made to see and act upon the benefits or costs of their activities that spill out on to others?
3. **(6 points)** When burned, diesel fuel such as that used by construction equipment emits particulate matter that can cause breathing and other health problems.
- a. How much diesel fuel would be sold in an unregulated market, and at what price? Show on a graph.
 - b. What is the socially optimal (efficient) amount of diesel, and at what price would it sell? Show on your graph above.
 - c. What is the efficient tax on diesel (the one that would internalize the external costs)? Show on your graph above and explain.

4. **(6 points)** U.S. and Chinese manufacturing plants emit carbon dioxide (CO₂), which leads to global warming. The international community would like to reduce CO₂ emissions from 200 billion tons to 80 billion tons, and they give you the following information about marginal abatement (pollution reduction) costs in each country:

China's marginal abatement costs are: $MAC_C = 0.3A_C$

The United States' marginal abatement costs are: $MAC_{US} = 1.5A_{US}$

- a. If the international community wants to minimize the costs of pollution abatement, by how much should they have China and the U.S. abate? You may assume that initially each country emits 100 billion tons. Use a graph to show this allocation of abatement, and solve for the actual numbers.
 - b. If the international community were to issue each country 40 billion pollution permits each, each of which allowed them to emit one ton of CO₂, would this system allow the countries to minimize the costs of reducing emissions? Explain.
5. **(6 points)** Discuss the main pros and cons (2 of each for each policy) for using a tax on carbon versus tradable permits to reduce greenhouse gases.