

Problem Set #6
PAI 723
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Solutions available Wednesday, December 4

1. The population of Utopia consists of five groups of people with different incomes. The table below shows the current income distribution for the city of Utopia. Concerned about the level of inequality, city leaders are debating three policies to redistribute income. The income distribution that results from each policy is shown in the rows below the current distribution.

	Income Group A	Income Group B	Income Group C	Income Group D	Income Group E	Total Income
Current income	\$100	\$90	\$50	\$30	\$20	\$290
Policy 1	\$85	\$80	\$50	\$40	\$30	\$285
Policy 2	\$50	\$45	\$45	\$40	\$35	\$215
Policy 3	\$70	\$65	\$60	\$40	\$25	\$260

- Which policy, if any, would a policy maker using a Rawlsian social welfare criterion support? Why?
 - Which policy, if any, would a policy maker using a utilitarian social welfare criterion likely support? Why?
 - Are any of the proposed policies Pareto improvements? Why or why not?
2. Mack's Messy Marbles manufactures marbles. The marginal cost per bag of marbles is \$4. Their finely crafted marbles are carefully hand-painted. Unfortunately, much paint is spilled while painting such small surfaces and drains into the local river. Many families live along the river, and they all own boats. Thousands of boats that are docked along the river are harmed by this paint. The damage done by the paint can be represented by the equation $MD = 0.2Q$. The demand curve for marbles is $P = 22 - Q$.
- From a societal viewpoint, what is the efficient level of marble production? Illustrate on a graph.
 - How many marbles are produced without government intervention? Add this outcome to your graph.
 - What can be done to ensure that an efficient number of marbles are produced?

3. Negotiators are currently working to craft a new international agreement to limit emissions of greenhouse gases that contribute to climate change. Consider two hypothetical countries, Freedonia and Drusselstein. Below are estimates of the marginal costs of abatement of greenhouse gases for each country:

Abatement (in tons)	Freedonia	Drusselstein
1	\$15	\$25
2	\$20	\$35
3	\$25	\$45
4	\$30	\$55
5	\$35	\$65
6	\$40	\$75
7	\$45	\$85
8	\$50	\$95
9	\$55	\$105
10	\$60	\$115

- The negotiator's goal is to reduce 10 tons of greenhouse gas emissions. To do this, they first consider requiring each country to abate 5 tons. What is the total cost of abatement for Freedonia? For Drusselstein? What is the combined total for both countries?
 - Is this the cheapest way to reduce 10 tons of emissions? If not, can you suggest a better strategy? How many tons should Freedonia reduce to minimize clean-up costs? How many tons should Drusselstein reduce to minimize clean-up costs? Please explain how you found your answer.
 - For firms within a single country, what types of policies are used to achieve an allocation of clean-up responsibility such as you suggested in part (b)? Explain how such policies work to bring about the efficient solution. What hurdles might the implementation of such a policy face in an international setting, when allocating emission reduction responsibilities across countries, rather than across firms within a single country?
4. At Clinton Square in downtown Syracuse, the city charges skaters \$3 to use the rink. I.C. Snow, a local community activist, argues that this fee is unfair. She claims that the rink is a public good – it is operated by the city's Parks and Recreation department, and the construction of the Clinton Square area (and the rink itself) was financed with taxpayer money. The director of the Parks and Recreation department has asked you to prepare a response to I.C. Snow's argument. How will you respond? Is her claim that the rink is a public good valid? Why or why not? Does it make sense to charge a fee for using the rink?

5. The Hogwarts School of Wizardry and Witchcraft is planning to build up to three new outdoor recreation facilities that will be open to all members of the school. Three members of the student council – Harry, Cedric, and Malfoy – will be voting on locations for the rec centers. Each rec center will cost \$1,500. The costs will be shared equally among the three houses that each voter represents (e.g. \$500 per house for each that is built). The total benefits that each house receives from each location are given in the table below:

location:	voters:		
	Harry	Cedric	Malfoy
Gryffindor	1000	400	0
Hufflepuff	600	800	400
Slytherin	200	200	2000

- Since each recreation center will be open to all students and will not have a method for charging admission, it can be treated as a public good. Based on the information above, at which locations would it be efficient to build a rec center?
 - Suppose that a majority rule vote was held separately for each location. Which locations would win approval? How does this compare to your answer in part (a)? Please explain any differences that may occur.
 - To increase the chances of approval, rec center supporters decide to bundle all three projects into a single vote. Thus, rather than voting on each project separately, the council members simply vote on whether or not to build rec centers at all three locations. How would each council member vote in that case? Which voters are helped by this strategy? Which are hurt?
6. California state law holds electric utilities responsible for damage from wildfires caused by their equipment. Their liability is unlimited, and does not depend on whether or not the utility took appropriate precautions to lower the risk of wildfires, such as trimming branches near power lines.

Because of the unlimited liability faced by utilities in the state of California, private sector insurance companies will not insure California utilities for wildfire damages. In response, the state of California set up a public insurance fund run by the state to cover damages from wildfires. All utilities in the state must pay into the fund, which covers costs of property damage due to wildfires started by electric equipment.

- Suppose that the same companies that insure other electric utilities in the United States were also required to insure California utilities. Suppose as well that all policies to utilities must sell for the same price (e.g. the insurance companies could not price discriminate).

How would you expect the cost of a policy sold as described above to compare to the cost necessary to provide full coverage of a California utility using the state fund, which only receives payments from utilities in California? Why?

- To be eligible to participate in the California state fund, utilities must first earn a safety certification. The safety certification documents that they have taken appropriate actions to mitigate fire risk. Consider the market failures present in insurance markets. What market failure is this requirement intended to address?