

Problem Set #6
PAI 897
Professor David Popp
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Solutions Available Wednesday, December 1

- 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?
- 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:

		voters:		
		Harry	Cedric	Malfoy
location:	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 houses are helped by this strategy? Which are hurt?

3. Golf balls are hand crafted by artisans in Scotland. Demand for golf balls can be represented by the curve $P = 105 - 2Q$, where Q represents boxes of golf balls. The marginal cost per box of golf balls equals $0.5Q$. However, to produce dimples on golf balls, the artisans must chip away at the surface of the balls, creating small waste particles that pollute the local environment. The damage done to the local environmental is given by the following marginal damage curve: $MD = Q$.
- Assume that the market for golf balls is perfectly competitive. How many boxes of golf balls will be produced if nothing is done to regulate the pollution? At what price will they be sold? Use a graph to illustrate your answer.
 - What is the socially efficient level of golf ball production? What should the price be? Use a graph to illustrate your answer.
 - To bring about the level of production you found in part (b), the government proposes using a Pigouvian tax. At what level should they set the tax? How do you know this?
4. Two factories pollute the air over Gallifrey. Each factory currently emits 12 tons of particulate matter into the local airshed. Scientists estimate that to neutralize the effect of this pollution, 12 tons of pollution from these factories will need to be eliminated. The marginal costs of reduction for each firm are as follows:

Abatement	Cyborg Cement	Dalek Drones
1	\$4	\$12
2	\$8	\$24
3	\$12	\$36
4	\$16	\$48
5	\$20	\$60
6	\$24	\$72
7	\$28	\$84
8	\$32	\$96
9	\$36	\$108
10	\$40	\$120
11	\$44	\$132
12	\$48	\$144

- The government's goal is to reduce 12 tons of pollution. To do this, they require each firm to abate 6 tons. What is the total cost of abatement for Cyborg Cement? For Dalek Drones? What is the combined total cost of abatement for both firms?
- Is this the cheapest way to reduce 12 tons of total pollution? If not, can you suggest a better strategy? How many tons should Cyborg Cement clean up to minimize total clean up costs? How many tons should Dalek Drones clean up to minimize total clean up costs? Please explain how you found your answer.
- Can you suggest a policy that will lead the firms to clean up the amounts you propose in part (b)? Explain how the policy works to bring about the efficient solution.

5. 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.

- a) 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?

- b) 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?