

Problem Set #7  
PAI 897  
Professor John McPeak

Name: \_\_\_\_\_

Due \_\_\_\_\_

1) Externalities.

a. Draw a supply and demand curve representing a perfectly competitive market. Then illustrate how to represent the presence of a negative externality generated as a byproduct of the supply of this good. Illustrate how the socially optimal outcome differs from the perfectly competitive market outcome in this example.

b. Describe in turn how a Pigovian specific tax on suppliers, and emissions fee, and a emissions standard can be used by policy makers to move from the perfectly competitive outcome towards the socially optimal outcome.

2) Syracuse is considering opening a sewage treatment plant that will release treated water into Onondaga Lake. The Onondaga Yacht club members sail yachts in this lake. The Yacht club is trying to decide on the membership fee they should charge this year. The Onondaga Yacht club can charge nothing, have no members and make no profit, set a fee of \$100 per person and have the profits listed in the table, or a \$200 per person fee and have the profit listed in the table. The payoffs to Syracuse are cost reductions from the current level for sewage treatment. Syracuse can choose no plant, a small plant, or a large plant.

		Onondaga Yacht Club					
		No fee		\$100 fee		\$200 fee	
Syracuse sewage treatment	No plant	0	0	0	14,000	0	15,000
	Small plant	10,000	0	10,000	10,000	10,000	5,000
	Large plant	15,000	0	15,000	2,000	15,000	-3,000

- a) Describe the full set of best response strategies and the Nash Equilibrium outcome of this game.

A court has passed a judgment that Onondaga Yacht club must be compensated by Syracuse by \$7,000 if the small plant is built and \$14,000 if the large plant is built. The following payoffs result.

		Onondaga Yacht Club					
		No fee		\$100 fee		\$200 fee	
Syracuse sewage treatment	No plant	0	0	0	14,000	0	15,000
	Small plant	3,000	7,000	3,000	17,000	3,000	12,000
	Large plant	1,000	14,000	1,000	16,000	1,000	11,000

- b) Describe the full set of best response strategies and the Nash Equilibrium outcome of this game.

- c) Contrast these outcomes to the two players in terms of Pareto optimality and using concept of Pareto improvement.

3. Describe a policy option to deal with:  
a. A Tragedy of the Commons problem

b. Externality problems as per the Coase Theorem

c. The free rider problem in public good provision

4) Public goods.

a. We are considering the demand for the number of butterfly houses to put in the city parks in the city of Syracuse this spring. Here  $q$  is the number of butterfly houses put in the parks that will be accessible to the three residents of Syracuse (urban flight has gotten out of control). Francis has a willingness to pay for butterfly houses defined by  $30-q$ . Gloria has a WTP defined by  $40-4*q$ . Otto has a WTP defined by  $80-5*q$ . What is total marginal willingness to pay on the societal demand curve for the provision of the 5<sup>th</sup> butterfly house?

b. If the marginal cost of butterfly house provision is constant at 60 per house and no effort is made to avoid the free rider problem, how many butterfly houses will we end up with and who will provide them?

c. Is the number of butterfly houses you found in part b more, equal to, or less than the socially optimal number of butterfly houses? If not equal, by how many butterfly houses different? If equal, why?