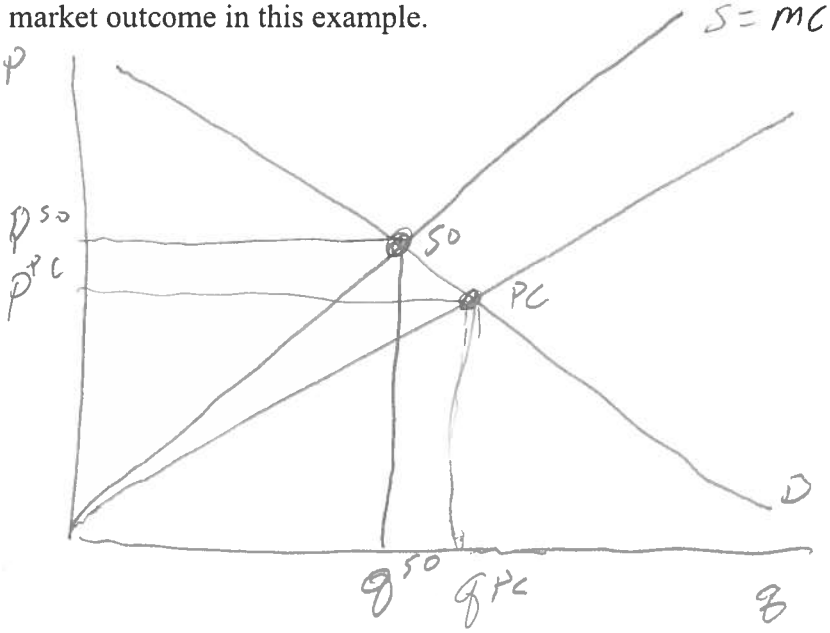
Problem Set #7
PAI 897
Professor John McPeak

Name: KEY

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.



MC^P – Marginal cost to the private firm

MC^E – marginal cost of the externality

MC^S – Marginal cost to society.

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.

1) Pigovian tax. Define a specific tax on supplies where for each unit of q a tax T of $MC^E(q^{SO})$ is charged. This will make $MC^P + T$ passes through the point $(P^{SO}; q^{SO})$.

2) Charge an emissions fee on the emission that is causing the negative externality so that production is reduced from q^{PC} to q^{SO}

3) Regulate production levels and the associated emissions so that production is reduced from q^{PC} to q^{SO}.

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.

BR

If SST no plant, OYC $200 fee
If SST small plant, OYC $100 fee
If SST large plant, OYC $100 fee
If OYC no fee, SST large plant
If OYC $100 fee, SST large plant
If OYC $200 fee, SST large plant

NE

SST plays large plant and gets 15,000
OYC plays $100 fee and get 2,000

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.

BR

If SST no plant, OYC $200 fee
If SST small plant, OYC $100 fee
If SST large plant, OYC $100 fee
If OYC no fee, SST small plant
If OYC $100 fee, SST small plant
If OYC $200 fee, SST small plant

NE

SST plays small plant and gets 3,000, OYC plays $100 fee and gets 17,000

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

The outcome in part a is not Pareto optimal because it is possible by making different decisions SST and OYC could obtain a higher combined payoff at (small plant, $100) with payoffs (10,000, 10,000)
The outcome in part b is Pareto optimal as it has the highest combined payoffs possible (10,000 + 10,000 = 20,000).
The outcome in part b does not Pareto improve on the outcome to part a since it makes SST worse

3. Describe a policy option to deal with:

a. A Tragedy of the Commons problem

Choose from: quantity regulation
privatization
user fee

b. Externality problems as per the Coase Theorem

Define a right to be free of harm for those experiencing the negative externality and negotiate compensation for those causing the harm to pay those experiencing the harm.

Define a right to impose the harm on those causing the harm and negotiate compensation for those experiencing the harm to pay the harming person to reduce the harm.

c. The free rider problem in public good provision

Define required provision of the public good by individuals (mandatory 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 5th butterfly house?

F: $30-q$, WTP = 0 at $q=30$
G: $40-4q$, WTP = 0 at $q=10$
O: $80-5q$, WTP = 0 at $q=16$

from 0 to 10, $WTP^S = 150-10q$
from 10 to 16, $WTP^S = 110-6q$
from 16 to 30, $WTP^S = 30-q$

$WTP^S(q=5) = 150-10(5)$
$= 150-50$
$= 100$

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?

only Otto has a WTP high enough to provide the good privately.

$80-5q = 60$
$5q = 20$
$q = 4$

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?

It is less than the socially optimal number.

$150-10q = 60$
$90 = 10q$
$q^{SO} = 9$

Socially optimal amount is 9 which is 5 more than Otto is willing to provide privately