Problem Set #10 Name:_____
PPA 723, Fall 2003 Morning or Afternoon class
Professor John McPeak
Not due – practice for final

1) The demand curve is given to you as Q=200-10*p.
    a. Fill out the following table. (Use the relatively higher price / relatively lower quantity pair in the elasticity calculation.)

P	Q	Elasticity
0		--------
5		
10		
15		
20		

    b. Draw this demand curve with price on the y axis and quantity on the x axis. Identify on this graph the range over which the demand curve is inelastic, and over which it is elastic. Identify the unit elastic point.

2) Suppose you are setting tolls for the Tappan Zee Bridge.
    a. The current toll is $3.00. Approximately 135,000 vehicles cross the bridge per day. If the price elasticity of demand for Tappan Zee Bridge crossings is estimated to be -1.25, what percent change in the number of crossings do you predict if the toll rises to $4.00 (use the current toll and crossing information in your calculation)?

    b. What is the predicted number of crossings per day after the toll is raised?

    c. Which toll level offers the higher level of revenue?

3) Say you are given that Q= 20-2*p is the demand curve.
    a. What is the inverse demand curve?

    b. If you know that Q=10+3*p is the supply curve, what is the equilibrium price-quantity pair?

    c. Illustrate the price quantity pair that is socially optimal if you know that production of the good in question imposes an externality equal to 2*Q.

4) If we put quantity produced by firm A on the y axis and quantity produced by firm B on the x axis, illustrate the relative positions in quantity space of the following market structures:
    a. Monopoly by firm A
    b. Cartel collusion between firm A and firm B
    c. Oligopoly competition
    d. Firm A and B operate in a competitive market.

5) Deriving demand.
    a. Derive a price-consumption curve from the underlying budget constraint and consumer preferences.

    b. Derive an income-consumption curve from the underlying budget constraint and consumer preferences.

    c. Contrast these two in order to illustrate the difference between movement along a demand curve and a shift in demand.

6) Fill in the following table. What is the technical term associated with the slope of the following curves?

Curve	**Slope**
Cost	
Indifference Curve	
Production function	
Isoquant	
Budget constraint	

7) If I double the size of capital and labor (the only two inputs) in my long-run production function, and my output increases by more than 2 times the output I had before I doubled my inputs,
    a. What type of returns to scale does my production function exhibit?

    b. Is this type of returns to scale more common for low, medium, or higher levels of output? Why?

    c. Does this imply that I do not have diminishing marginal returns to both capital and labor? Why or why not?

8) Describe how the process of deriving the market demand for a private good differs from the process for deriving the total demand for a public good, noting how non-rivalry and non-exclusion factor into the difference.

9) Assume you are given the following matrix of payoffs for two firms. The numbers are level of production that can be adopted by the firm in question, the left hand side payoff is to the coal burning plant, the right hand side payoff is to the laundry.

	Laundry that uses clotheslines			
Coal burning plant		0	1	2
	0	0, 0	0, 12	0, 14
	1	10, 0	10, 10	10, 8
	2	14, 0	14, 2	14, 1

a) Is one firm imposing an externality on the other? If so which one and how do you know this? If not, how do you know this?

b) What is the outcome of this game in terms of levels of production and payoffs if each firm plays their best response strategy?

c) If the laundry approaches the coal burning plant and offers to pay them 5 dollars if they produce at level 1 rather than level 2, does this improve on the result in (b) in the Pareto sense?

d) According to the Coase Theorem, does the efficient outcome vary whether we assign the property right to the use of the air to the laundry or the coal burning plant?

10) Defining elasticities. Provide the formula for calculating the following, and answer all follow up questions.

a) Define a supply elasticity.

b) Define an own-price demand elasticity.

c) Define a cross price demand elasticity.

i) Is this positive or negative if the two goods in question are substitutes?

d) Define an income elasticity of demand.

i) Is this positive or negative for a normal good?

11) If we know the quantity demanded is defined by Q=16-2*p, and the quantity supplied is defined by Q=4+2*p,

a. What is the equilibrium output if the firm is a monopoly?

b. What is the equilibrium price?

c. Illustrate on a graph the deadweight loss of a monopoly market structure compared to a competitive market structure.

d. If there is a production externality, does your calculation in (c) overstate or understate the size of the deadweight loss?

12) Discounting.

a. Why do we discount?

b. Is there any difference between stating a future expense in real dollars or stating it in net present value? If so, what is the difference? If not, why not?

c. Does a higher discount rate place a greater or lesser weight on future expenses?

13) Fill in the missing information in the following table.(a)

Labor Units	Total Product	Marginal Product	Average Product
0	0	----------	----------
1	5		
2	15		
3	21		
4	25		
5	28		
6	30		

b) Is this likely to be a short run or a long run production function? Why?

c) Is this enough information to identify economic efficiency? Why or why not.

14) Say there is a community owned plot of land. We are deciding whether to put up a swingset or a duck pond on the plot of land. Assume a discount rate of 10% is applicable in this case and that the project time horizon is three years (construction year, use year 1, use year 2).

a. If the cost of building the swingset is $15,000 right now, and the annual upkeep costs next year and the year after are estimated to be $1,500 per year, what is the present value of costs for the swingset project?

b. If the cost of building the duck pond is $20,000 right now, and the annual upkeep costs next year and the year after are estimated to be $500 per year, what is the present value of costs for the duck pond project?

15) Continue the example from the problem above. Three families live in this community, and will share the costs of the project selected equally. They are meeting to vote on the project tomorrow morning. Assume you know that the three households have **present value benefits** represented by the numbers described in the following table.

	Household A	Household B	Household C
Swing set	4000	8000	6000
Duck pond	11000	5000	6000

a. What is the net present value for each project? Show how you arrived at this conclusion.

b. Which project will pass in the vote tomorrow? Show how each household will vote for each project, and explain why they will vote this way.

EXTRA PRACTICE QUESTIONS

EXTRA1) Draw an indifference curve where the two goods in questions are perfect complements, and then draw one where the two goods in question are perfect substitutes.

EXTRA 2) Note the letter from the list of the minimum set of information you need to identify the following conditions.

A. Market Prices
B. Consumer Preferences
C. Consumer Income
D. Production Function
E. Producer Surplus
F. Presence or Absence of Externality
G. Market Structure
H. Input costs

Condition	
Indifference Curve	
Profit Maximizing Point	
Cost Minimizing Point	
Technically Efficient Point	
Optimal Bundle	
Budget Constraint	

EXTRA 3) Complete the following table.

a) Quantity of Output	Fixed Cost	Total Cost	Average Cost	Marginal Cost	Variable Cost	Average Variable Cost
0	5	5	----------	---------	----------	
1		17				
2		26				
3		38				
4		51				
5			13			
6				15		
7		97				
8					112	

b. If the market price for the output produced is 12, what level of output is the profit maximizing level of output? Explain your answer.

EXTRA 4) The Children's Mental Health Network of CNY and The United Way of CNY are both considering launching fund raising drives in January in the Central New York (CNY) region. They are faced with the following options for level of fundraising effort and anticipated payoffs.

	United Way			
CMHN		Low	Medium	High
	Low	5,000 50,000	5,000 100,000	4,000 120,000
	Medium	10,000 50,000	8,000 80,000	6,000 90,000
	High	12,000 40,000	9,000 60,000	7,000 70,000

a) Describe the full set of best response strategies for each player.

b) What is the Nash Equilibrium outcome of this game?

c) What is "the commons" in this game, and how can we think of the common resource in terms of rivalry and exclusion?

d) Does being relatively large provide any market leader (in the Stackelberg sense) advantage to the United Way? If so, how? If not, why not?

e) Describe some policy options open to a benevolent social planner to address the tragedy of the non profit fundraisers.