Final Name: _____
PPA 723, Spring 2004
Professor John McPeak
April 29, 2004

The total final is worth 30 points. Each question is worth 2 points, and each sub question is worth an equal share of the two points.

1) The demand curve is given to you as Q=300-50*p.
    a. Fill out the following table (use the relatively higher price / relatively lower quantity pair in the elasticity calculation).

Price	Quantity	Elasticity
$1.00		----------
$2.00		
$3.00		
$4.00		
$5.00		

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

2) Assume you are given the following matrix of profit for two firms. The firms choose a level of production. The left hand side payoff (profit) is to the coal burning plant, the right hand side payoff is to the laundry.

	Laundry that uses clotheslines			
Coal burning plant		None	Low	High
	None	0, 0	0, 12	0, 11
	Low	10, 0	10, 10	10, 8
	High	14, 0	14, 2	14, 1

a) Does the payoff matrix indicate that both firms are imposing a negative externality on each other, one firm is imposing a negative externality on the other, or that there is no negative externality imposed by either firm on the other? Explain your answer.

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

c) Does a policy that gives the Laundry first mover status lead to the socially efficient outcome? Why or why not?

3) Highland agriculture in Ethiopia is facing problems due to soil erosion. You are considering two different programs that will address the soil erosion problem over a four year time horizon (t=0, t=1, t=2, t=3). The present value of benefits due to reduced soil erosion resulting from **either program** is estimated to be 5 million dollars. The discount rate is given as 10%.

Program One: Agroforestry. This tree planting project will cost 3 million dollars in the current year (t=0). The trees will provide a benefit in addition to combating soil erosion in the form of marketable seeds. This benefit is estimated to be 0.5 million dollars in the first year after they are planted (t=1), 1 million dollars in the second year after they are planted (t=2), and 0.5 million dollars in the third year after they are planted (t=3). After this time the trees will no longer produce seeds, thus this benefit will come to an end.

Program Two: Bund construction. Bunds are an anti soil erosion measure that involves building dirt and stone rows across steeply sloped land to reduce soil erosion. Bund construction will take two years, the current year (t=0) and next year (year 1). It will cost 1 million dollars each year to construct these bunds.

a. Which program is superior in NPV terms?

b. Does your answer change if the benefits of the marketable seeds is lower than predicted in the original scenario, and is instead 0.25 million when t=1, 0.5 million when t=2, and 0.25 million when t=3?

4) The price of food is $5 per unit, and the price of all other goods is $20 per unit. The consumer's income is $500.

a. Draw the consumer's budget constraint.

b. If the price of food increases to $10 per unit, draw the consumer's new budget constraint.

c. If the price of food decreases to $2.50 per unit, draw the consumer's new budget constraint.

d. Place all three budget lines on a single graph, and draw indifference curves to illustrate the derivation of the price-consumption curve.

5) You are given that p=26-2*q is the inverse demand curve and p=8+2*q is the inverse supply curve.

a. What is the equilibrium price quantity pair if the market is perfectly competitive?

b. What is the equilibrium price quantity pair if there is a single supplier in the market, and this supplier faces the curve MC=8+2*q?

c. What is the socially optimal price quantity pair if there is a negative externality generated in the production of the good that has a marginal cost per unit of 6?

6) Continue with the basic information from problem five. **You are now to assume the externality introduced in (5c) was present in cases (5a) and (5c) as well as you answer this question.**

a. Graph your answers to 5 a, b, and c on a single graph.

b. Fill in the following table for the magnitude of the following according to your graph for (6a).

	Solution to (5a)	Solution to (5b)	Solution to (5c)
Consumer Surplus			
Producer Surplus			
Externality			
Deadweight loss			
Total Welfare			

7) Over the course of the spring, the price of natural gas has decreased by 4%. Bert tells Ernie that this is because consumers' taste has shifted away from natural gas since electricity has become cheaper to heat with over this time span. Ernie tells Bert he thinks the reason is that supply has shifted due to deregulation that impacted producers of natural gas.

a. Graph Bert's argument on a supply and demand graph.

b. Graph Ernie's argument on a supply and demand graph.

c. If the equilibrium quantity of natural gas in the market increased over this time period, who is right, Bert or Ernie?

8) Complete the following table.

a) Quantity of Output	Fixed Cost	Total Cost	Average Cost	Marginal Cost	Variable Cost	Average Variable Cost
0		14	----------	---------	----------	----------
1		34				
2		53				
3		71				
4		88				
5		106				
6		125				
7		145				
8		166				

b. If the market price for the output produced is 20 and the market structure is competitive, what level of output is the profit maximizing level of output, and why?

c. Is this a short run or a long run cost table? Why?

9) Types of goods.

a. What type of good goes in the blank?

	Rival	Non Rival
Exclusion		
Non Exclusion		

b. Contrast how we derive market demand from individual demand for private goods and public goods based on the characteristics defined in (a) using either words or graphs (or both if you feel fancy!!!).

10) Tax policy.

a. Illustrate on a supply and demand graph a specific tax of size τ placed on consumers.

b. Illustrate on a supply and demand graph a specific tax of tax of size τ placed on suppliers that results in consumers bearing the entire incidence of the tax (there are two possibilities - one is all you need here).

c. Illustrate on a supply and demand graph the impact of an ad valorem tax rate of α.

11) The local zoo is considering raising the price of annual membership from $50 to $60. If the current membership level is 4,000 and the best available information suggests that the price elasticity of demand for zoo membership is -1.2, answer the following questions.

a. What will be the membership level if the price is raised?

b. Compare total revenue for the zoo at the price of $50 and at the price of $60. Which is higher?

c. Is the price elasticity of demand characterized as inelastic, unit elastic, or elastic?

12) Necessary and sufficient conditions. Circle the correct answer.

Condition One	**Condition Two**	**To identify condition two as true, is condition one necessary or sufficient?**
A good is inferior.	A good is a Giffen good.	*Necessary* *Sufficient*
An input bundle satisfies the condition: marginal rate of technical substitution $= -\frac{w}{r}$.	The output produced with this input bundle is technologically efficient.	*Necessary* *Sufficient*
The market is a perfectly competitive market	Price taking behavior by producers	*Necessary* *Sufficient*
The bundle x_1, x_2 satisfies $p_1 \cdot x_1 + p_2 \cdot x_2 \leq Y$	The bundle is an optimal bundle	*Necessary* *Sufficient*
Average Cost upward sloping	Marginal cost > average cost	*Necessary* *Sufficient*
There are only a few firms producing in a given market	The firms are colluding	*Necessary* *Sufficient*
A good is characterized by non exclusion	The good is a public good	*Necessary* *Sufficient*
Output more than doubles when inputs double	The firm is experiencing increasing returns to scale	*Necessary* *Sufficient*

13) Note the letter from the minimum set of information from the list of information below (A to H) needed to identify the concept in the table below. More than one is possible.

A. Selling price of goods
B. A consumer's preferences
C. A consumer's income
D. A firm's production function
E. Producer surplus in a market
F. Presence or absence of externality in a market
G. Cost of inputs used in production

Concept	What from A – H is needed to define this concept?
Indifference Curve	
Profit Maximizing Point in a perfectly competitive market	
Cost Minimizing Point	
Technologically efficient production	
Optimal Bundle	
Budget Constraint	

14) The good in question is cheddar cheese, and we can assume that the market for this good is perfectly competitive, at an equilibrium point, and there are no negative externalities. We are given results that indicate: crackers are a complement of cheddar cheese; brick cheese is a substitute for cheddar cheese; cheddar cheese is a normal good.

a. Illustrate the impact on a supply and demand graph for cheddar cheese of an increase in the price of crackers.

b. Illustrate the impact on a supply and demand graph for cheddar cheese of an increase in the price of brick cheese.

c. Illustrate the impact on a supply and demand graph for cheddar cheese of an increase in consumers' income.

d. Illustrate the impact on a supply and demand graph for cheddar cheese of an increase in the price of milk (which is used to make cheddar cheese).

15) The Children's Mental Health Network of Central New York and The United Way of Central New York are both considering launching fund raising drives in May in Syracuse. They are faced with the following options for level of fundraising effort and anticipated net payoffs (revenue – cost for each level of effort).

		United Way		
		Low	Medium	High
CMHN	Low	5,000 50,000	4,500 100,000	4,000 120,000
	Medium	10,000 45,000	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 nature of the negative externality imposed by one decision maker on another in this game?

d) Could having the two non-profits coordinate their fund raising activities offer the potential for a Pareto improving outcome? Why or why not.