

University of Pennsylvania
Department of Economics

Syllabus for Economics 35
Industrial Organization, Section 1, Fall 2015

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Classes: TR 9-10:30
Office Hours: Mon 11-13
(and by appointment)

Course Description and Objective

This is an advanced course in microeconomics. Theories of various industrial organizational structures and problems are developed, including monopoly, oligopoly, Nash Equilibrium nonlinear pricing and price discrimination. These theories are then applied to the study of various industries, antitrust cases, and regulatory issues, and may be extended to Bundling and Debundling issues, Deal prone and other intertemporal issues. During classes we may discuss the implications of firm policies on consumers and the society welfare and the regulation actions of policy makers.

Prerequisites: Economics 1. Economics 2 is recommended. Knowledge of calculus is strongly advised.

There are no make-up examinations in this course. Students are expected to come to each and every class. Students are expected to schedule their time so that they will be present during the review sessions, if offered.

Text:

Industrial Organization: Contemporary Theory and Practice, (PRN) Fourth Edition, by Lynne Peppall, Daniel J. Richards and George Norman, South Western.

Other Texts

The Economics of Price Discrimination, (EPD), by Louis Philips, Cambridge University Press, reprinted 1989.

The Theory of Industrial Organization, by Jean Tirole, The MIT Press, 1988.

Industrial Organization: Theory and Applications, by Oz Shy, The MIT Press, 1996.

Course Requirements and Grading

Your grade will be based upon one midterm examination and a final weighted equally. There will be problem sets assigned (part attached) during the semester. They are designed to give you the opportunity to review and practice the material learned in class. We recommend working in small study groups. No credit to the problem sets. Several make-up classes and review sessions will be held and will be announced in advance in class.

A Tentative Reading List Subject to Changes (based on PRN)

Introduction	Chapters 1-2
Technology, Costs, and Market Structure	Chapters 3-4
Basic Monopoly Pricing and Product Strategies	Chapters 5-6
Price Discrimination of first, second and third degree,	EPD
Two-Part Tariff policy pricing	EPD
Product and Pricing Strategies for the Multi-product Monopolist	Chapter 7-8
Theories of Business Strategy in Oligopoly Markets	Chapter 9-11
Monopoly Power and Predatory Conduct	Chapter 12-13
Collusion and Cartels (optional)	Chapter 14-15
Mergers	Chapters 16-17
Advertising (optional)	Chapter 20-21
Current Critical Issues: (optional)	
Bundling and Debundling, Network Externalities,	EPD and Tirole
Transportation Costs (optional)	EPD and Tirole

Concentration

There are no make up examinations in this course.

Information about the TA and Review Sessions: TBA

Before the midterm and the final: Review Sessions, Tentative Days, subject to changes: TBA

Exercises

QUESTION 1

A monopoly produces product X according to the following cost function:

$$TC = 1200 + 20X$$

The monopoly faces the demand curve of the market:

$$D: P_x = 100 - X$$

- a. Find the equilibrium values of the monopoly case in terms of P_x , X , TR , TC , Π and $C.S.$
- b. Is the competitive equilibrium feasible? Why?
- c. The monopoly gains pure economic profit and produces too little, therefore the "regulator" imposes a price ceiling and considers two possibilities.
 - I. Price ceiling at the points where $AR=AC$.
 - II. Price ceiling at the points where $AR=MC$ combined with a subsidy.

Discuss both possibilities from the welfare point of view.

QUESTION 2

A single producer of good X faces the following cost function in \$ terms and the market demand is as follows:

$$TC = 1000 + 6X^2.$$

$$D: P_x = 280 - X$$

- a. For a simple monopoly determine the producer's revenues, costs and profits.
- b. An economist who examines the results claims that the monopoly cannot survive in the long run. Is he right?
- c. The economist suggests a second degree price discrimination policy. What are the price quantities, revenues, costs and profits?
- d. From the consumer and welfare point of view is the solution of item c preferable?
- e. Repeat items (a)-(d) assuming a new cost function: $TC = 3000 + 6X^2$.

QUESTION 3

- a. In a competitive market N identical firms produce item Q according to the following cost function of each firm: $TC_i = 400 + 20q_i + q_i^2$ (for $i = 1 \dots N$)

The market demand for Q is: $D = P = 140 - \frac{Q}{100}$

Find the long run market equilibrium of the following values:

$P_E =$ _____ $q_i =$ _____ $Q_E =$ _____ TR of each firm = _____
 TVC of each firm = _____ $N =$ _____ (Economic profits) $\Pi =$ _____
Consumer Surplus: _____, Social Welfare: _____

- b. The market demand is multiplied such that for every market price the new quantity demanded by the whole market is doubled. Find the short-run equilibrium, assuming no entry of new firms into the industry, for all the terms mentioned in (a).
- c. Find the new long-run equilibrium for all the terms mentioned in (a) assuming free entry of new firms into the industry.

QUESTION 4

A Penn airline uses an airplane with 120 seats and sells flight tickets to faculty members (F) and students (S). The demand of each group is as follows:

$$D_F : P = 200 - T_F$$

$$D_S : P = 160 - 0.25T_S$$

The flight cost per customer is \$20. The fixed cost is \$1000.

- a. How does the airline allocate seats between faculty members and students if price discrimination is prohibited?
- b. How does the airline allocate seats between faculty members and students if the airline discriminates between the two groups?
- c. Compare prices, revenues, and profits of the airline for each case.

- d. How would you change your answer to (a)-(c) if the university decides to subsidize student flights by \$40 per ticket?
- e. The university signs a contract with a big airline with unlimited number of airplanes and seats, such that each flight per customer costs the airline \$20 as before. The airline introduces a new fare system for faculty members where T_F^1 tickets will be sold for the price of P_1 and additional T_F^2 ticket will be sold for a lower price of P_2 . Help the airline to determine the optimal values that maximize profits. Compare the results of this price discrimination (second degree) to the case where only one optimal price is offered the faculty member.
- f. Optional question. Three prices
- g. Optional question. Price discrimination of the third degree.

QUESTION 5

The market demand for Honey, H, is as follows:

$$D: P = 260 - H$$

In the market there is only one monopoly (beehive keeper) producer whose production cost of honey is \$20 for each unit of H.

- a. Find the total revenue, cost, and profit of the monopoly.
- b. Find the consumer surplus and the DWL (Deadweight Loss).
- c. The government supports the entry of another honey producer (beehive keeper) with the same production cost who produces the same honey (identical in quality terms, etc). Find the new price level, quantities produced by each producer, total revenue, costs and profits (Cournot).
- d. How does the entry of another producer affect the consumer surplus and Deadweight Losses?

- e. The original producer becomes the "Leader" (the smart long sight producer) and the new firm stays myopic or the "follower". Answer items (c) and (d) based on the new solution (Stacklberg).

QUESTION 6

The demand for beer, b , during two periods 1 and 2 is as follows:

$$b_1 = 120 - P_1$$

$$b_2 = 120 + 0.5b_1 - P_2$$

- a. The beer producer maximizes profits at each period ignoring intertemporal effect (he is myopic). The total cost function for each period is as follows:

$$TC_i = 20b_i \quad i = 1, 2$$

- b. After learning at Penn he became a long-sight "planner" and decided to maximize total profit from the output of the two periods (assume an interest rate of zero).
- c. Compare pricing policies, quantities, revenues, and profits for the two cases discussed at items (a) and (b).
- d. How does the beer producer utilize the addiction effect of beer drinking?

QUESTION 7

A monopoly faces two demand curves of individual 1 and individual 2 as follows:

$$D_1 : P_1 = 150 - X_1$$

$$D_2 : P_1 = 120 - X_2$$

The cost function is:

$$TC_i = 30X_i \quad i = 1, 2$$

- a. Determine price quantities and profit for the case of a simple monopoly.
- b. Determine price quantities and profit for the case of a discriminating monopoly of the first order.
- c. The monopoly sets a two-part tariff policy with no discrimination. Determine price, quantities and profit.

- d. The same as item (c) but the monopoly sets a two-part tariff discriminating policy.
- e. Optional: Answer item (a) and/or (c) when the monopoly faces the following different demand curves:

$$D_1 : P_1 = 150 - X_1$$

$$D_2 : P_2 = 70 - 0.25 X_2$$

Midterm Exam
ECON 35
Professor Uriel Spiegel

Question 1

A monopoly produces good X facing the following market demand:

$$D: P = 220 - X$$

The cost function that the firm faces is as follows:

$$TC = 1000 + 40 X$$

- a) Find the values of price, P, quality; X, total revenue; TR, total cost; TC, profits; Π , and deadweight loss, DWL, at equilibrium that are determined by the monopoly.
- b) Due to high monopoly pure economic profits, the government allows another identical firm to join the market and compete with the monopoly according to Cournot's model. Give (answer?) the new values of item (a) above for each firm and find the new value of the DWL.
- c) Prove that perfect competition equilibrium cannot exist.
- d) How many more identical firms do you recommend to allow entry into the industry/market to maximize the total social welfare? If you have difficulties in calculation it, explain it in your own words without exact calculation.
- e) The scenario is changed and we now assume that the monopoly is facing an entry of additional firms that are not identical to the monopoly, but the goods they are selling are substitutes (but not perfect substitutes!). As a result the monopoly facing a shift of the demand – parallel downwards shift of the demand, until all pure economic profits are eliminated. We call this scenario equilibrium of a "Monopolistic Competition".
- f) Determine price, quantity demand, total revenue, and cost. Do not forget that the pure economic profit is zero!

Question 2

Explain the importance of the Lerner Index and illustrate very briefly why it is not always so reliable.

Question 3

Consider an industry of 10 firms that are sharing their revenues. One firm earns \$900 and nine other firms earn all together a total of \$100.

- a) Calculate the HHI (Herfindahl-Hirschman Index) that is discussed in ch. 3 of your book.
- b) Plot the Lorenz Curve and "estimate" the "Gini coefficient" value.
- c) If we face a different industry where again the total revenue is \$1000, but now 2 firms gain \$450 each and additional 18 firms earn (all together) a total of \$100, can you verify which industry demonstrates a higher degree of a market concentration?

Question 4

The demand for alcoholic beverage of young people depends on price, as well as the history of drinking, indicating the phenomenon of "intertemporal effect" that you can have a good term in English: Write the term on the questionnaire!

The demand at the first period, 1, is:

$D_1 : P_1 = 100 - X_1$ where P_1 is the price in \$ terms and X_1 number of bottles the young drink in the first period

The demand at the second period, 2, is:

$D_2 : P_2 = 100 + 0.5 X_1 - X_2$ where P_2 is the price in \$ terms and X_2 number of bottles the young drinks in the first period, where the production cost of each bottle is \$20.

- a) Find the pricing policy of a myopic monopoly producer of the beverage.
- b) Find the pricing policy of a long-sight monopoly producer.
- c) Compare profits of each policy.

Final Exam
ECON 35 – December, 2012
Professor Uriel Spiegel

Question 1

The demand market of Disneyland can be decomposed into two groups:

(1) Children, C, and (2) Adults, A.

The demand of children C, to Disneyland Park facilities, X_C , is

$$D_C: P = 160 - X_C$$

The demand of parents (Adults), A, for Disneyland Park facilities, X_A , is

$$D_A: P = 130 - X_A$$

The cost per use of each facility by each person is \$10:

- g) What is the optimal price discrimination of the first degree of Disneyland owner?
- h) Based on what you have studied in the course suggest three different policies that may increase revenues.
 - (i) Third degree price discrimination with two different prices for each group.
 - (ii) Two-part tariff policy with no discrimination.
 - (iii) Two-part tariff policy allowing price discrimination.

In each policy solve the prices, total revenues and compare profits.

Question 2

The customers of Penn Bookstore are non-homogeneous and the table below represents the reservation prices R,P, for two kinds of books: X_1 and X_2 .

RP of Individual	RP ₁	RP ₂	RP ₃	RP ₄	RP ₅	RP ₆
X ₁	5	4	3	5	7	0
X ₂	5	6	7	3	1	8

- a) Find the optimal single price on each book. How many books will be sold and what is the total revenue?
- b) Find the maximum revenues the bookstore may gain under complete price discrimination. How many books of each kind will be sold?
 - i) The bookstore makes a "clearance" and sells the books "bundled". There is *no* sale of a single book. What is the optimal bundled price? What are the revenues?
 - j) Optional: A mixed strategy is officered so each consumer can buy the "bundled" at price, $P_B = \underline{\hspace{1cm}}$ and $P_1 = \underline{\hspace{1cm}}$ and $P_2 = \underline{\hspace{1cm}}$ for a sale of each separated book. How close are the new revenues to the revenue the bookstore gains at item (b)?

Question 3

- a) What are the conditions for price discrimination?
- b) Give an example of debundling policy that increases profits.

Question 4

An airline holds one aircraft with 90 available seats. The flight from Airport A to Airport B costs \$1000 regardless of how many passengers are taking the flight. The daily demand for flight (one flight per day!) of market 1 is:

D: $P_5 = 120 - S$ where S - number of seat tickets or passengers
and P_5 - the airfare in \$ terms for each seat

- a. As a simple monopoly airline, determine how many passengers will take the flight and what is the optimal fare, P_5 , revenues, cost and losses? How many seats will be occupied every day?
- b. Because of the losses the airline decides on a new policy of selling "first" S_2 seats in price P_5^2 and additional S_1 seats will be sold for a higher price, P_5^1 . What are the values of P_5^1 , P_5^2 , S_1 and S_2 ? Total revenues, total costs and profits? How do you define this kind of price discrimination? (Remember! $S_1 + S_2 \leq 90$).
- c. Since the airline found that some seats are still available (how many?) the airline honor extends the price discrimination and decides on three different fares where $S_1 + S_2 + S_3 = 90$.
- d. Compare revenues and profits at item (a), (b) and (c).
- e. A new market is opened to the airline where the airline can sell each seat for \$70 and there is *no limit* of number of seats at this price (elastic demand). How does the airline sell seats if the airline is not allowed to discriminate between market 1 and the new market?
- f. The same situation as item (e) above, but price discrimination is possible.
- g. Compare profits and price elasticities in items (X) and (X).

GOOD LUCK!

Fall 2013 Midterm for Econ 035

Dr. Spiegel

November 4, 2013

For all questions in which you are asked to fill in blanks on the test, be sure to include your work in your blue book, and write the answers into the table.

1. In an industry for an electric toy, there is only one company, Company 1. Before the holidays, Company 1 faces the following demand curve:

$$(D): P_T = 200 - T$$

where T is the number of units sold.

The production cost of each unit is \$20.

- (a) Fill in the values to the table below, and in your blue book, show your work.

$P_T =$ _____	$T =$ _____	$TR =$ _____	$TC = TVC =$ _____
Profit Margin = _____	Profit = _____	CS _____	
Dead Weight Loss = _____	Social Welfare = _____		
Lerner Index = _____	Concentration (HHI) = _____	Gini Coefficient = _____	

Due to the high deadweight loss that the monopoly generates, the government decides to shrink the monopoly and weighs two different policies:

- i. Impose a price ceiling on the monopoly of $P_T = 90$
 - ii. Allow another firm, Company 2, to enter the market, and produce the same toy with the same technology and shocks. The new market is called a Duopoly.
- (b) For each of the two options, repeat the table again:

- i. For policy (i):

$P_T =$ _____	$T =$ _____	$TR =$ _____	$TC = TVC =$ _____
Profit Margin = _____	Profit = _____	CS _____	
Dead Weight Loss = _____	Social Welfare = _____		
Lerner Index = _____	Concentration (HHI) = _____	Gini Coefficient = _____	

- ii. For policy (ii)

$P_{T_1} =$ _____	$T_1 =$ _____	$TR_1 =$ _____	$TC_1 =$ _____
$P_{T_2} =$ _____	$T_2 =$ _____	$TR_2 =$ _____	$TC_2 =$ _____
Profit Margin ₁ = _____	Profit ₁ = _____	Profit Margin ₂ = _____	Profit ₂ = _____
CS _____	DWL = _____	Social Welfare = _____	
Lerner Index = _____	Concentration (HHI) = _____	Gini = _____	

- (c) Can you evaluate which of these policies is "better" from society's point of view?

- (d) Company 1 realizes that Company 2 is sharing equally in the profits. Company 1 then spends \$200 to investigate the behavior of (myopic) Company 2. Company 1 is not a monopolist, but rather is longsighted (or leader), and behaves as if in a Stackelberg model. Repeat the table in this scenario:

$P_{T_1} =$ _____	$T_1 =$ _____	$TR_1 =$ _____	$TC_1 =$ _____
$P_{T_2} =$ _____	$T_2 =$ _____	$TR_2 =$ _____	$TC_2 =$ _____
Profit $Margin_1 =$ _____	$Profit_1 =$ _____	Profit $Margin_2 =$ _____	$Profit_2 =$ _____
CS _____	DWL = _____	Social Welfare = _____	
Lerner Index = _____	Concentration (HHI) = _____	Gini = _____	

- (e) Repeat part (c) above, and compare the solution of the Cournot model with that of the Stackelberg model

2. In a competitive market, there are 100 firms producing item q . Their cost function is identical for each firm, and is:

$$TC_i = 100 + 10q_i + q_i^2$$

where q_i is the amount produced by firm i .

The market demand function is:

$$(D) \quad P = 90 - \frac{Q}{50}$$

Where $Q = \sum_{i=1}^{100} q_i$.

Find the supply curve, S , when all 100 firms produce equal quantities as price takers.

$$(S) \quad P = \text{_____}$$

As before, fill in the space, and show your work in your bluebook.

- (a) Find the short run equilibrium

$$P_E \text{_____} \quad Q_E \text{_____} \quad q_i \text{_____}$$

The pure economic profits of all the firms together are: _____

- (b) In the long run, due to entry of N firms, all economic profits have vanished. Explain why and how this happened.

- (c) Find the long run equilibrium values:

$$P_E \text{_____} \quad Q_E \text{_____} \quad q_i \text{_____}$$

The total number of firms that have entered into the market (N) is: _____

3. The statement: "In monopolistic competition and perfect competition, the long run equilibrium leads to the result that $P=ATC$. Thus, no pure economic profits exist."

- (a) Explain the statement, and indicate if it is correct or not.

- (b) Explain several differences between the solutions in the two market structures. Use figures and any explanation to clarify your answer.

4. (a) Mention and briefly explain the five main axioms of perfect competition market structure.

- (b) "If perfect competition cannot exist, we can "use" a natural monopoly solution, but we can choose a scenario that the market can survive with Nash Equilibrium, with $N > 1$ (N =number of firms)"

Discuss this issue based on what you have learned in this course

Good Luck!

Econ 035 Final Exam

Dr. Uriel Spiegel - December 18, 2013

Name: _____

1. The Athletics department at the University of Pennsylvania sells tickets to different students for the basketball and football games for the 2014 season. The students have different tastes for the different sports, and therefore have different reservation prices (RP) for each type of game. In the table below, you find the RPs, in dollar terms of the 10 students for the series of 10 games per season for each sport:

Students	1	2	3	4	5	6	7	8	9	10
Basketball Series	70	65	60	15	90	20	100	100	0	80
Football Series	80	70	60	115	110	120	10	25	100	5

- (a) Find the optimal single price fare for each of the two games series. How many tickets will be sold for the basketball games? How many for the football games? What will be the total revenue?
 - (b) If each student were to be treated separately and buy tickets according to his/her reservation price, the total revenue to the athletics department would be _____. Explain how you get this number in your blue book.
 - (c) The university decides on a uniform pricing strategy that each student pays for all games: a package deal of selling all games to all students at a price of \$120. How many students will buy tickets? What are the revenues?
 - (d) A student from the ECON 35 course claims that the policy offered by the athletics department is not a good one due to the fact that revenue could be higher, and more students could participate. Instead, the student suggests a new price of _____ that increases revenue to _____ and allows _____ students to watch the games. What is the policy?
 - (e) Another student claims further that it is better to sell the package deal at a price of \$_____, and allow some students to buy only the basketball series at a price of \$_____ and/or buy the football series for a price of \$_____. He claims that it may increase revenue further. Is he right?
2. An Airline company has two aircrafts to use over the regular and peak seasons. One has $N' = 120$ seats, while the other has $N'' = 200$. However, the costs per rider for each airplane are $C' = 50$ for the small aircraft, and $C'' = 70$ for the larger aircraft. Assume there are no fixed costs for either aircraft.

Further assume that there are two groups of flyers: children (C) and adults (A), each with different demand functions for each season, Peak (P), and Regular (R):

Regular	Peak
$d_{R,C} : P_{R,C} = 100 - C$	$D_{P,C} : P_{P,C} = 150 - C$
$d_{R,A} : P_{R,A} = 200 - A$	$D_{P,A} : P_{P,A} = 500 - 2A$

Where $d_{R,C}$ is the demand function for children during the regular season (and $P_{R,C}$ is the price), $d_{R,A}$ is the demand function for adults during the regular season (and $P_{R,A}$ is the price), $D_{P,C}$ is the demand function for children during the peak season (and $P_{P,C}$ is the price), and $D_{P,A}$ is the demand function for adults during the peak season (and $P_{P,A}$ is the price).

- (a) How many seats will remain available in each season, and which aircraft will be used under price discrimination of the first degree by the profit maximizing Airline company? Find prices, quantities, and profits in each period using each of the airplanes individually.
- (b) An economist argues for a different use of the airplanes in the peak season. Is he correct? Can you explain why or why not?
3. (a) Demonstrate graphically and explain briefly under what conditions a Two-Part-Tariff policy may lead to a solution with $P < MC$.
- (b) Is it possible to sell items in one period where the price does not cover the variable cost for the sake of "other" profits? What do we mean by "other?"
- (c) Explain the term "Intertemporal Effects," and give brief examples of this phenomenon that we studied in this course.
- (d) Explain the Friedman D approach and another approach we have studied in class under which the fare of a bus ride from Philadelphia to Atlantic City will be more expensive than a ride from Philadelphia to New York, despite the fact that the distance between Philly and NYC is twice as large as the distance between Philly and AC. Use an appropriate formula to demonstrate your answer.
4. A monopoly faces two demand curves of individuals 1 and 2:

$$P_x = 125 - X_1, \quad P_x = 100 - 0.8X_2$$

Where P_x is measured in dollar terms. The production cost of each unit of the good is \$25.

The monopoly can use four different policies to set prices:

- (a) Price discrimination of the first degree
- (b) Price discrimination of the third degree, with two different prices and two different quantities in each market
- (c) Two part tariff with no discrimination between the individuals
- (d) Two part tariff with discrimination

Find prices, quantities, profits, and total consumer surplus for each of the four pricing strategies.

5. A myopic producer faces a different demand function in each of periods 1 and 2:

$$X_1 = 120 - 2P_1, \quad X_2 = 150 - P_2 - 0.5X_1$$

Where X_1 and P_1 are period 1 quantity and price respectively, and X_2 and P_2 are period 2 quantity and price respectively.

The production cost also depends on the period:

$$TC_1 = 20X_1, \quad TC_2 = 10X_2$$

- (a) Explain briefly possible reasons for the different cost functions and the economic and psychological interpretations of the demand function X_2 .
- (b) Find the solution under the above cost and demand functions for the myopic producer.
- (c) Can you advise the myopic producer to change his behavior? How much can you charge the producer for your advice (assuming you can charge for all extra profit you construct)?

Good Luck!

**Econ 235, Exam
December 29, 2014
Prof. Uri Spiegel**

Question 1

A monopoly, firm 1, faces an initial demand as follows;

$$D_1 : P_1 = 200 - 2X_1$$

and a cost function of

$$TC_1 = 100 + 20X_1$$

- a.) What are profits in the short run?
- b.) In the long run the demand for X_1 depends also on N , number of competitor firms who want to enter to the industry with some substitute good, thus, new demand firm 1 face is:

$$\hat{D} : P = 200 - 2X_1 - \sqrt{N}$$

How many firms enter into the industry in the long run? Calculate profits, production and price charged by firm 1 in the long run.

Question 2

Production of one ton of Bananas, B , at Florida USA, requires 10 hours of labor and 1000 gallons of water. Each hour of work cost \$25 and a gallon of water cost the farmers \$0.15. The demand for Bananas (in tons) is as follows:

$$D : P_B = 1000 - 0.1B$$

where P_B denotes the price of a ton of bananas, and B is quantity of bananas measured in tons. All farmers are coordinating as a cartel.

- a) Find the total quantity of B , and the price of each ton of B , P_B .

Due to government efforts the market for Banana is opened to import bananas, B_2 from Columbia, by producers who face the same production process but facing a lower wage rate that is only \$5 per working hour, and face the same water cost per gallon. The bananas are perfect substitutes in terms of color, taste, size etc.

- b) How does your answer change to (a) in terms of objective function, and in terms of B_1 , production of USA, B_2 , production of Colombia, P_B ?

- c) Due to the power of Colombian producers, they become leaders and the American farmers are followers, and myopic. Repeat your answer to part (b)(Hint:Stackelberg)
- d) Compare the profit distribution between Colombian and American farmers using the following measures 1. Concentration Curve 2. HHI 3. Gini Coefficient 4. Lerner Index for the following two cases, b) duopoly, c) Stackelberg.

Question 3

The students at Penn like to watch the games of Penn football teams, X_1 , and basketball teams, X_2 . Several students have their reservation prices, RP, in \$ terms for each game as presented in the table below:

	RP_A	RP_B	RP_C	RP_D	RP_E	RP_F	RP_G	RP_H
X_1	50	60	45	25	100	40	15	0
X_2	10	20	45	50	20	40	70	80

Table 1: Reservation prices

- a.) Find the revenue of the university for selling each kind of game in the same price to every individual who buy the ticket.
- b.) Find the revenue that the university may gain under complete/perfect price discrimination.
- c.) The university decides to sell only bundled tickets of pair of tickets for football and basketball games. Find the revenues.
- d.) Is it possible to gain more than at part c) under mixed strategy. Demonstrate one possible mixed strategy that increases the revenue that the university made at part c).
- e.) How do you change your answer to item d) if a faculty member joins to the fans of Penn, and is ready to pay \$120 for the football game, but he is not ready to pay even a dollar for the basketball game?

Question 4

Discuss the following

1. The main differences between perfect competition and monopolistic competition equilibrium
2. In what sense the two market scenarios are the same and differ from each other?
3. From the private and social point of view, which market scenario has advantages or disadvantages?

Question 5

The demand for electricity is

$$P = 200 - 0.001Q^3$$

Q is measured in 1000 KHW, P is measured in dollar terms. The marginal cost of 1000 KHW is \$ 30 including the use of gas. In addition the transportation of the gas for 1000 KWH is \$25

1. Find the social optimum solution (“perfect competition equilibrium”) in terms of the price and quantity Q.
2. If the company is a monopoly, what is the solution in quantity and price terms?
3. Due to increase in the crude oil price the transportation cost increases by \$15. How will it change the equilibrium price of electricity and quantity in case of social optimum? And in the case of monopoly? (Hint: Who pays the transportation burden?)

Good Luck!

Econ 235, Exam
December 19, 2014
Prof. Uri Spiegel

Question 1

A monopoly, firm 1, facing an initial demand as follows;

$$D_1 : P_1 = 200 - 2X_1$$

and the cost function is

$$TC_1 = 100 + 20X_1$$

a.) What are profits in the short run?

In the long run the demand for X_1 depends also on N , number of competitor firms who eager to enter to the industry with some substitute good, thus, new demand firm 1 face is:

$$\hat{D} : P = 200 - 2X_1 - \sqrt{N}$$

b.) How many firms enter into the industry in the long run, and calculate profits of firm 1 in the long run?

Question 2

Production of Bananas, B , at USA at Florida where one ton of Banana requires 10 hours of labor and 1000 gallons of water. Each hour of work cost \$25 and a gallon of water cost the farmers \$0.15.

The demand for Banana is as follows:

$$D : P_B = 1000 - 0.1B$$

where P_B denotes the price of banana, and B is quantity of bananas measured in tons. All farmers are coordinating as a cartel.

a) Find the total quantity of B , and the price of each ton of B , P_B .

Due to government efforts the market for Banana is opened to import bananas, B_2 from Columbia, by producers who face the same production process but facing a lower wage rate that is only \$5 per working hour, and face the same water cost per gallon. The bananas are perfect substitutes in terms of color, taste, size etc.

b) How does your answer change to (a) in terms of objective function, and in terms of B_1 , production of USA, B_2 , production of Columbia, P_B ?

c) Due to the power of Columbians producers, they become leaders and the American farmers are followers, and myopic. Repeat your answer to part (b) (Hint: Stackelberg)

d) Compare the profit distribution between Columbian and American farmers using the following measures 1. Concentration Curve 2. HHI 3. Gini Coefficient 4. Lerner Index for the following two cases, b) duopoly, c) Stackelberg.

Question 3

Explain the reason(s) for price stickiness according to Sweezy model using appropriate figure in oligopolistic markets.

	RP_A	RP_B	RP_C	RP_D	RP_E	RP_F	RP_G	RP_H
X_1	50	60	45	25	100	40	15	0
X_2	10	20	45	50	20	40	70	80

Table 1: Reservation prices

Question 4

Explain and illustrate by numerical example the reason(s) for sorting several consumption items according to quality or size rather selling the item without sorting according to weight.

Question 5

The students at Penn like to watch the games of Penn football teams, X_1 , and basketball teams, X_2 . Several students have their reservation prices, RP, in \$ terms for each game as presented in the table below:

- Find the revenue of the university for selling each kind of game in the same price to every individual who buy the ticket.
- Find the revenue that the university may gain under complete/perfect price discrimination.
- The university decides to sell only bundled tickets of pair of tickets for football and basketball games. Find the revenues.
- Is it possible to gain more than at part c) under mixed strategy. Demonstrate one possible mixed strategy that increases the revenue that the university made at part c).
- How do you change your answer to item d) if a faculty member joins to the fans of Penn, and is ready to pay \$120 for the football game, but he is not ready to pay even a dollar for the basketball game?

Question 6

Discuss the following

- The main differences between perfect competition and monopolistic competition equilibrium
- In what sense the two market scenarios are the same and differ from each other?
- From the private and social point of view, which market scenario has advantages or disadvantages?

Question 7

The demand for electricity is

$$P = 200 - 0.001Q^3$$

Q is measured in 1000 KHW, P is measured in dollar terms. The marginal cost of 1000 KHW is \$ 30 including the use of gas. In addition the transportation of the gas for 1000 KWH is \$25

- Find the social optimum solution ("perfect competition equilibrium") in terms of the price and quantity Q.
- If the company is a monopoly, what is the solution in quantity and price terms?
- Due to increase in the crude oil price the transportation cost increases by \$15. How will it change the equilibrium price of electricity and quantity in case of social optimum? And in the case of monopoly? (Hint: Who pays the transportation burden?)