Microeconomic Analysis
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Problem Set #4

Instructions
(a) Answer all four questions.
(b) Answer each question *completely* and make sure that all your answers are in complete sentences. Always include calculations, tables, graphs, etc. where appropriate.
(c) **All answers must be typed** (note the change).
(d) Unless you know how to do them on a computer, make sure to construct neat, scaled graphs using a ruler. I would recommend using graph paper.
(e) Staple together or otherwise securely fasten all pages.
(f) The completed problem set must be handed to me before your final exam on December 12th. Sending me the problem set as an email attachment *would result in a one-grade reduction,* as would tardiness or failure to observe the above instructions.

Good luck!

1) Assume that the U.S. supply and demand for sugar can be described as follows (Q is in billions):

$$Q_S = -7.95 + 0.66P$$
$$Q_D = 29.73 - 0.19P$$

a) What are equilibrium price and quantity?
b) Calculate the world sugar price (P_W) at which the U.S. would import 10 billion pounds. Show both (a) and (b) on the same graph. Label completely. Is there a deadweight loss? If so, how much?
c) Show on the graph what happens when the U.S. imposes an import limit (quota) of 5 billion pounds. Specifically, show graphically and calculate changes in the welfare of consumers, sugar farmers, the government, and foreign sugar exporters. Is there a deadweight loss? If so, how much?

2) Suppose that an industry is characterized as follows:

$C = 100 + 2q^2$	each firm's total cost function
$MC = 4q$	firm's marginal cost function
$P = 90 - 2Q$	industry demand curve
$MR = 90 - 4Q$	industry marginal revenue curve

a) If there were *only one firm* in the industry, find the monopoly price, quantity, and level of profit
b) Find the price, quantity, and level of profit if the industry were competitive.

c) Graphically illustrate the demand curve, marginal revenue curve, marginal cost curve, and average cost curve. Identify the difference between the profit level of the monopoly and the profit level of the competitive industry in two different ways. Verify that the two are numerically equivalent.

3) A monopolist faces the demand curve $P = 11 - Q$, where P is measured in dollars per unit and Q in thousands of units. The monopolist has a constant average cost of $6 per unit.
   a) Draw the average and marginal revenue curves and the average and marginal cost curves. What are the monopolist's profit-maximizing price and quantity? What is the resulting profit? Calculate the firm's degree of monopoly power using the Lerner index.
   b) A government regulatory agency sets a price ceiling of $7 per unit. What quantity will be produced, and what will the firm's profit be? What happens to the degree of monopoly power?
   c) What price ceiling yields the largest level of output? What is that level of output? What is the firm's degree of monopoly power at this price?

4) Elizabeth Airlines (EA) flies only one route: Chicago-Honolulu. The demand for each flight is $Q = 500 - P$. EA's cost of running each flight is $30,000 plus $100 per passenger.
   a) What is the profit-maximizing price that EA will charge? How many people will be on each flight? What is EA's profit for each flight?
   b) EA learns that the fixed costs per flight are in fact $41,000 instead of $30,000. Will the airline stay in business for long? Illustrate your answer using a graph of the demand curve that EA faces, EA's average cost curve when fixed costs are $30,000, and EA's average cost curve when fixed costs are $41,000.
   c) Wait! EA finds out that two types of people fly to Honolulu. Type A consists of business people with a demand of $Q_A = 260 - 0.4P$. Type B consists of students whose total demand is $Q_B = 240 - 0.6P$. Because the students are easy to spot, EA decides to charge them different prices. Graph each of these demand curves and their horizontal sum. What price does EA charge the students? What price does it charge other customers? How many of each type are on each flight?
   d) What would EA's profit be for each flight? Would the airline stay in business? Calculate the consumer surplus of each consumer group. What is the total consumer surplus?
   e) Before EA started price discriminating, how much consumer surplus was the type A demand getting from air travel to Honolulu? Type B? Why did total consumer surplus decline with price discrimination, even though total quantity sold remained unchanged?