

Econ 461 - Industrial Organization
 Stafford, Spring 2001
 Solution to Problem Set 1

1. The market for "queues" can be described by the following demand curve:
 $Q = 1000 - 50P$

a) If each firm's marginal cost is 10, calculate the market output and price under perfect competition.

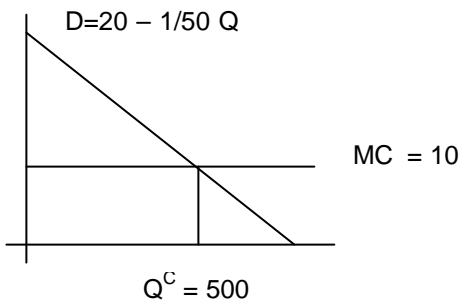
Under perfect competition, $P = MC$.
 $P^C = 10$. $Q^C = 1000 - 50 \cdot 10 = 500$

b) Assume that a single firm can monopolize the market by lobbying congress, but that this firm has higher marginal costs = 12. Calculate market output and price for the monopoly.

Under monopoly, $MR = MC$.
 $MR = ?$ $TR = P \cdot Q = (20 - 1/50 Q) \cdot Q = 20Q - 1/50 \cdot Q^2$. $MR = 20 - 2/50 \cdot Q$
 $12 = 20 - 2/50 \cdot Q^M$. $Q^M = 200$. $P^M = 20 - 1/50 \cdot Q^M = 20 - 1/50 \cdot 200 = 16$

c) Calculate the total loss of consumer surplus from monopolization. Calculate the deadweight loss from monopolization. (Hint: Draw a graph of the monopoly market and use the formula for the area of a triangle -- $1/2 \text{ base} \cdot \text{height}$ -- to calculate the losses.)

Consumer surplus under perfect competition = $1/2 \text{ base} \cdot \text{height} = 1/2 \cdot 500 \cdot (20-10) = 2500$



Consumer surplus under monopoly = $1/2 \cdot 200 \cdot (20 - 16) = 400$
 Loss in consumer surplus = $2500 - 400 = 2100$

Total surplus under perfect competition = $CS + PS = 2500 + 0 = 2500$
 Total surplus under monopoly = $CS + PS = 400 + 200(16 - 12) = 1200$
 Deadweight loss = $2500 - 1200 = 1300$

2. The market demand for carbonated water is $P = 20 - 9Q/2$. There are two firms producing water, each with a constant marginal cost of \$2.

a) What is the market equilibrium price and quantity when each firm behaves as a Cournot duopolist choosing quantities? What are the firms' profits?

Profit maximization for firm 1 requires that $MR = MC$.
 $TR = (20 - 9/2 q_1 - 9/2 q_2) q_1 = 20 q_1 - 9/2 q_1^2 - 9/2 q_1 q_2$
 $MR = 20 - 9 q_1 - 9/2 q_2$

Set equal to MC: $20 - 9q_1 - 9/2 q_2 = 2$? $q_1 = 2 - q_2/2$

By symmetry, $q_2 = 2 - q_1/2$.

To find equilibrium, solve for q_1 : $q_1 = 2 - q_2/2 = 2 - (2 - q_1/2)/2 = 1 + q_1/4$. $q_1 = 4/3 = q_2$.

Then market price = $20 - 9(4/3 + 4/3)/2 = 8$.

Profit = $(8-2)4/3 = 8$

b) What is the market equilibrium price and quantity when each firm behaves as a Bertrand duopolist choosing price? What are the firms' profits?

If the firms act as Bertrand duopolists, $P = MC = 2$.

Market Q can be found from demand: $2 = 20 - 9/2(Q)$. $9/2(Q) = 18$. $Q = 4$. $q_1 = q_2 = 2$.

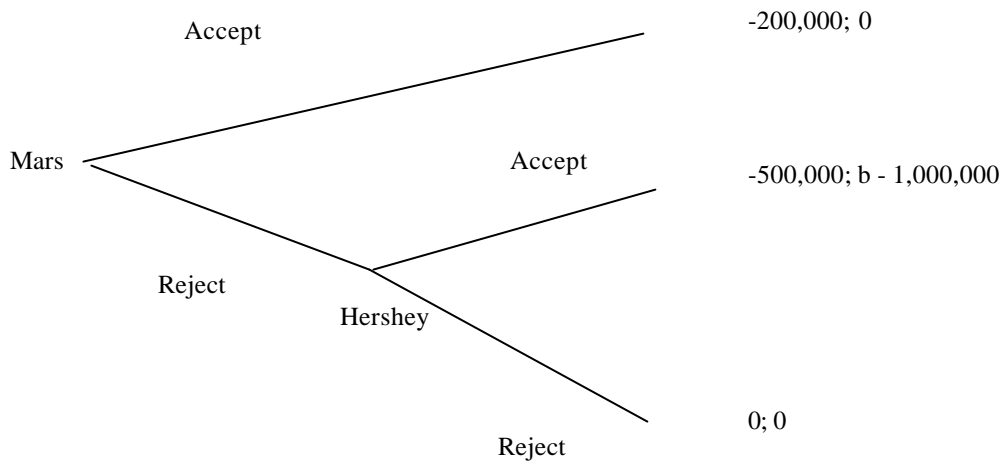
Profit = 0.

Exercise 4.3, parts a & b

a&b) For version (i) Impeachment is the dominant strategy for both players. Thus, (Impeachment, Impeachment) is the unique Nash Equilibrium. For version (ii) Impeachment is a dominant strategy for Time, but not Newsweek. However, once Impeachment is eliminated for Time, Financial Crisis is the optimal choice for Newsweek. Thus (Impeachment, Financial Crisis) is the unique Nash Equilibrium. For version (iii) there are no dominant strategies. There are two Nash Equilibria, (Impeachment, Financial Crisis) and (Financial Crisis, Impeachment).

Exercise 4.4

The game can be depicted as follows:



If b is greater than \$1 million, then Hershey should accept if Mars rejects. Knowing that Hershey's will accept, Mars should accept. The SPE is then (Accept, Accept). If b is less than \$1 million then Hershey should reject if Mars rejects. Knowing that Hershey's will reject, Mars should reject. The SPE is then (Reject, Reject). Since we know that Hershey's accepted (Reese's Pieces are the candy featured in the movie) this suggests that the game depicted above is not complete. In particular, the game above assumes that the two parties know the payoffs for each outcome with certainty. However, if Mars were to underestimate the payoff to

Hershey's, Mars could have mistakenly believed that Hershey's would not take the deal. Additionally if Mars misunderstood the effect of the Reese's product placement on its on sales, it might have mistakenly believed that the payoff from buying the product placement was less than the payoff when Hershey's bought the product placement. Alternatively, it has been suggested that Mars sales may have benefited indirectly from the Reese's product placement as many consumers mistakenly thought the Reese's pieces were in fact M&Ms. If this is true, the payoff to Mars under the Reese's product placement may be higher than the game tree above suggests.