

Problem Set #16

Sonoma State University
Economics 305-Intermediate Microeconomic Theory

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Suppose that a market is composed of two firms, each with the same cost structure in which $MC = ATC = \$20$

Total Market Demand is given by: $Q^D = 200 - 2P$.

Assume that the firms behave as Cournot duopolist.

- (1) Derive the reaction functions for each firm.
- (2) Derive the profit maximizing output of each firm.
- (3) Derive the profit maximizing price.
- (4) What is the profit per unit at the profit maximizing output?
- (5) What is the total profits of each firm?
- (6) Show the Cournot equilibrium graphically.

Suppose instead that the firms decide to collude and form a cartel.

- (7) What is the profit maximizing total market output? Explain your answer.
- (8) What is the profit maximizing price?
- (9) What is the profit per unit at the profit maximizing output?
- (10) Assuming that the firms equally share the market, what is the total profit of each firm?

Suppose that instead of two equally sized firms, the market is composed of a small number of firms, with one dominant firm and can be represented by the following:

Total Market Demand: $Q^D = 200 - 2P$.

The competitive fringe supply function: $Q^S = \frac{1}{2}P - 12.5$.

The dominant firms marginal cost function: $MC = 10 + \frac{1}{2}Q$.

Use the dominant firm model to answer the following questions.

- (11) What is the minimum price needed for the competitive fringe to supply positive units of output?
- (12) At what price does the competitive fringe supply output to the entire market?
- (13) Derive the dominant firms residual demand function.
- (14) Derive the dominant firms marginal revenue function.
- (15) What is the equilibrium price set by the dominant firm?
- (16) At the equilibrium price set by the dominant firm, what is the total market demand?
- (17) At the equilibrium price set by the dominant firm, how much will the competitive fringe supply to the market?
- (18) At the equilibrium price set by the dominant firm, how much will the dominant firm supply to the market?
- (19) Show the above answers graphically.
- (20) The competitive fringe reduces the market power of the dominant firm. If the dominant firm wanted to try and eliminate the competitive fringe, how might the dominant accomplish this?
- (21) If the dominant firm eliminates the competitive fringe, explain how this will effect the model.
- (22) If the dominant firm eliminates the competitive fringe, derive the resulting equilibrium price and quantity.

Suppose that if the two firms collude, each firm will earn twenty million dollars in positive profits. However if one firm cheats on the collusive agreement, the cheating firm will earn thirty million in profits while the abiding firm will earn only five million. If both firms cheat, profits will return to the competitive level of ten million dollars for each firm.

Figure 1

		Firm A	
		Collude	Cheat
Firm B	Collude	(A, B) (,)	(A, B) (,)
	Cheat	(A, B) (,)	(A, B) (,)

- (23) Using Figure 1, complete the payoff matrix.
- (24) Derive the dominant strategy Nash equilibrium. Explain your answer.
- (25) Is there a solution that would benefit both firms more than the dominant strategy Nash equilibrium? If so, explain why this is not the Nash equilibrium.
- (26) Why is the collusive arrangement unstable? Explain.