Industrial Organization
ECNS 406
Fall 2012

Exam #: 3

Monday December 10, 2012

Name: ____________________________________________

Instructions:
You must answer exactly 4 of the following 5 questions. Be sure to clearly indicate which
questions you are answering. Each question is worth the same amount. You have the class
period to complete the exam.

Answer each question clearly and concisely. You must show your work to receive credit.

This exam is given under the rules of the Montana State University. You may not use
notes or receive any assistance. There is to be no talking during the exam.

Clearly print your name on your blue book. You must turn in your blue book(s) You do
not need to turn in the questions, only your blue book(s).
Hint: Given two demand curves

\[ q_1 = \frac{(a_1 - P)}{b_1} \]
\[ q_2 = \frac{(a_2 - P)}{b_2} \]

horizontal summation results in the following inverse demand curve.

\[ P = \frac{(b_2a_1 + b_1a_2)}{(b_1 + b_2)} - \frac{(b_1b_2)}{(b_1 + b_2)}Q \]

1. There are two types of representative consumers, 1 and 2, with the following inverse demand curves.

\[ P_1 = 126 - Q_1 \]
\[ P_2 = 186 - 2Q_2 \]

All firms have a constant marginal cost of $6.

(a) Find the equilibrium price and quantity with a monopolist who cannot price discriminate.

(b) Find the equilibrium price and quantity with a monopolist who can price discriminate between the two groups.

(c) Find the equilibrium price and quantity with a Cournot duopoly and no price discrimination.

(d) Find the equilibrium price and quantity with a Cournot duopoly with price discrimination between the two groups.

(e) Is it better to have a monopolist who can price discriminate or a Cournot duopoly that cannot price discriminate? Explain your answer.

2. The inverse of market demand is \( P = 120 - 4Q \). There are two firms, an incumbent and a potential entrant, and both firms compete in quantities. The costs of each firm are \( C(q) = 20q \) and the potential entrant faces an entry cost of \( E^2 \). The interest rate is 25%. Assume that the incumbent can costlessly and credibly commit to any production level. Answer the following questions.

(a) What is the incumbent’s limit quantity as a function of \( E \)?

(b) What are the incumbent’s discounted sum of profits from a limit pricing strategy?

(c) If \( E = 5 \) what is the incumbent’s optimal strategy?

(d) If \( E = 10 \) what is the incumbent’s optimal strategy?
3. There are three firms, A, B and C, each with a constant marginal cost of $7. All firms compete in quantities and the market demand is \( P = 167 - 4Q \).

(a) What is the best response of each firm with simultaneous competition?

(b) What are the firm quantities, profits, and equilibrium price with simultaneous competition?

(c) What is the best response of each firm with sequential competition where Firm A chooses the quantity first, Firm B chooses second, and Firm C chooses last?

(d) What are the firm quantities, profits, and equilibrium price with sequential competition?

(e) Compare the sequential equilibrium to the simultaneous equilibrium.

4. Consider a Hotelling monopoly model with Firm A located to the far left of the product space at \( x = 0 \). Consumers have a baseline valuation of $10 and travel costs are $1 per distance traveled. The monopolist has a constant marginal cost of $2 and the length of the product space is 20.

(a) What is the location of the indifferent consumer?

(b) What is the equilibrium price and monopoly profits?

(c) If the monopolist can perfectly price discriminate, what will be the equilibrium quantity?

(d) What is/are the price(s) with perfect price discrimination?

(e) Compare the equilibrium with perfect price discrimination to the equilibrium with no price discrimination.

5. There are two firms, A and B. The market demand is \( P = 60 - \frac{Q}{3} \). Firm A has a constant marginal cost of \( c_A \) and Firm B has a constant marginal cost of \( 2c_A \).

(a) Find the Cournot duopoly equilibrium price, firm quantities, and firm profits.

(b) Find the Bertrand duopoly equilibrium price, firm quantities, and firm profits.

(c) If Firm A could lobby the government to impose regulations that increase the cost of each firm proportionally (an increase in \( c_A \)), would it be beneficial for them to do so? Answer this for both the Cournot and the Bertrand equilibria.

(d) Assuming that \( c_A \) is sufficiently low (i.e. zero), by how much would Firm A want to increase \( c_A \) if it’s beneficial for them to increase \( c_A \)?