Name: ____________________________

Instructions:

You must answer exactly 4 of the following 5 questions. 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 above and in the space provided on the next page. You must turn in both sides of this cover sheet along with your responses. You do not need to turn in the questions, only your responses with the cover sheet.
Industrial Organization
ECNS 406
Fall 2010
Exam #: 3

Name: ________________________________

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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. Answer the following questions. (25)
   (a) A firm’s cost function is \( C(q) = 48 + 10q + 3q^2 \). What is the firm’s minimum efficient scale?
   (b) If the firm’s fixed costs quadruple, how does the firm’s minimum efficient scale change?
   (c) If the firm has \( N \) plants,
   \[ C(q) = N \left[ 48 + 10 \left( \frac{q}{N} \right) + 3 \left( \frac{q}{N} \right)^2 \right]. \]
   If \( q = 64 \), how many plants should the firm have to minimize cost?
   (d) This part is unrelated to the parts above. All else equal, which demand curve results in a less concentrated market: \( P = 100 - Q \) or \( P = 80 - \frac{1}{2}Q \)? Be sure to explain your answer and rationale.

2. Hammacher Schlemmer has developed a new durable device that you insert into your car’s DC power outlet to improve your fuel efficiency by 18%. There are two different types of consumers Hammacher Schlemmer can market this device to: suckers and skeptics. Suckers place a value on the device of $10 for each day it is used and skeptics have a value of $2 for each day it is used. Hammacher Schlemmer only expect the device to be on the market for 2 days before it is revealed as a scam. Any use on the first day is not discounted, but use on the second day is discounted by \( r = 25\% \).
   (a) If one out of ten consumers is a sucker and the firm charges a single price over the two days, what price would it charge?
   (b) If the firm charges a single price over the two days, how many more suckers are required such that the firm is indifferent between selling to both types of consumers or just to suckers?
   (c) If Hammacher Schlemmer sets two different prices over the two days, what price would it set the second day?
   (d) Using your answer for the part above, if Hammacher Schlemmer sets two different prices over the two days, what price would it set the first day?
   (e) Should the firm price discriminate over time and why or why not?
3. There are two types of representative consumers, 1 and 2, with the following inverse demand curves.

\[ P_1 = 20 - \frac{1}{4}Q_1 \]
\[ P_2 = 100 - 10Q_2 \]

Both markets are served by a monopolist who has a constant marginal cost of $0.

(a) If the monopolist can discriminate between the groups with a single per unit price (no fixed tariff), find the equilibrium price and quantity for each type of consumer.

(b) If the monopolist cannot discriminate between the groups but can use one two part tariff, what is the fixed tariff, the per unit price and the equilibrium quantity?

(c) Which pricing strategy described above does the firm prefer and why?

(d) If the monopolist cannot discriminate between the groups but can use two different two part tariffs, how does the fixed tariff for type 1 consumers, \( T_1 \), relate to the fixed tariff for type 2 consumers, \( T_2 \)? (Is \( T_1 \) larger than, less than, equal to \( T_2 \) and why?) How does the per unit price for type 1 consumers, \( p_1 \), relate to the per unit price for type 2 consumers, \( p_2 \)? Explain your answer.

4. 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.
5. There are two firms, A and B, with a constant marginal cost of $10. There are two markets, 1 and 2, with different goods. Firm A has a monopoly in market 1 so \( Q_1 = q_{1A} \), and both firms compete in quantities in the second market so \( Q_2 = q_{2A} + q_{2B} \). There is a representative consumer who’s utility maximization problem is as follows.

\[
\max_{m, Q_1, Q_2} U = m + 100Q_1 - \frac{1}{2}Q_1^2 + 100Q_2 - \frac{1}{2}Q_2^2
\]

subject to

\[
Y = p_1 Q_1 + p_2 Q_2 + m
\]

\( m \) is a composite good with a price normalized to 1. \( Y \) is the representative consumer’s income and \( p_1 \) and \( p_2 \) are the prices of their respective goods.

(a) Find the profits of each firm.

(b) Find the profits of each firm when firm A offers a pure bundle of \( b_A = q_{1A} + q_{2A} \). Is firm A better off?

(c) Find the profits of each firm when firm A offers a mixed bundle where firm A offers two products: \( b_A \) and \( q_{1A} \) where \( b_A = q_{1A} + q_{2A} \). (Note that firm A does not offer \( q_{2A} \) separately in this mixed bundle.) Is firm A better off with no bundling, a pure bundle or the mixed bundle?

(d) Are consumers better off with no bundling, a pure bundle or the mixed bundle?