Intermediate Microeconomics
ECNS 301
Fall 2015

Homework #: 7

Due by the beginning of class on: Tuesday November 24, 2015

Name: ________________________________________________

Instructions:
There are 3 questions worth a total of 100 points. Answer each question clearly and concisely. You must show your work to receive credit. You are allowed to work with others, but all work must be your own.

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. All pages must be stapled to be graded.
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Production & Costs

1. Tom Clancy is a taxi cab driver who drives people from Bozeman to the airport. He is a profit maximizing, price-taker. The market price for a taxi cab ride is $40. His costs are given by \( C = .1Q^2 + 20Q + 100 \), where \( Q \) represents the number of rides.

(a) How many taxi rides will he provide and what are his profits?

(b) Assume the city now requires a $100 per year license for all taxi cab drivers. Assume the market price (here, the price paid by buyers of the service) remains at $40. How many rides does Tom provide? What are his profits?

(c) Suppose the license was instead $1000 per year. Again, assume the market price (here, the price paid by buyers of the service) remains at $40. How many rides does Tom provide? What are his profits?

(d) Suppose instead the city requires all drivers to pay a $10 fee for each ride. Assume the market price (here, the price paid by buyers of the service) remains at $40. How many rides does Tom provide? What are his profits?

(e) How many rides does Tom provide and what are his profits if the city requires a $100 per year license for all taxi drivers as in part b, but we no longer assume that price remains at $40, and instead assume that all these are true:
   1. There are a fixed number of taxi drivers, all identical to Tom.
   2. Each firm’s demand for rides to the airport is perfectly inelastic and equal to the quantity per driver you found in part a.

(f) How many rides does Tom provide and what are his profits if the city requires a $10 fee per ride for all taxi drivers as in part d, but we no longer assume that price remains at $40, and assume that all these are true:
   1. There are a fixed number of taxi drivers, all identical to Tom.
   2. Each firm’s demand for taxi rides is perfectly inelastic and equal to the quantity per per driver you found in part a.

2. The perfectly competitive XYZ firm owns two plants, A and B. The cost functions for each of these plants is

\[
C_A = 5Q_A + .1Q_A^2 \\
C_B = 5Q_B + .2Q_B^2
\]

(a) Suppose the market price is $10. How many units will be produced by each plant?

(b) Suppose that the firm decides to produce 100 units of the product. How many will be produced by each plant? What will be the cost of the 100 units?

(c) What is the lowest price at which the firm will produce? Above that price, how will it divide production across the two plants? (Drawing your marginal and average cost functions here may help.)
3. Commuters to Fishlake have two alternate routes they can take.

Route $A$ is the freeway around town. It is uncongested, and so no matter how many commuters take it, it will take them each an hour. The total amount of commuting time by all commuters on route $A$ is then $60N_A$, where $N_A$ is the number of commuters who take route $A$.

Route $B$ is a more direct route through town that is congested. An individual’s commuting time depends on the number of commuters. If the commuter is the only one of the road, the drive takes 30 minutes. With $N_B$ travelers on the road, the commute is $30 + (N_B - 1)/200$. Total commuting time on this route by all travelers is $30N_B + N_B(N_B - 1)/200$.

(a) There are 10,000 commuters who make this commute. How many take route $A$? How many take route $B$?

(b) What allocation across the two roads would minimize total commuting time?