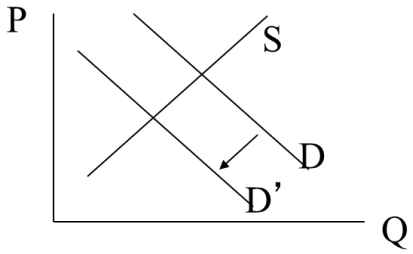
COMM/FRE 295
Midterm Answers – Oct. 26, 2011

Multiple Choice Questions: (Correct answers are shown with asterisks and in bold.)

1. You have just taken a new job in the electronics industry. Your boss comes to your desk and informs you that the price of ceramic condensers has fallen and this has important implications for tantalum capacitors. Your boss uses the following diagram to illustrate what has happened in the market for tantalum capacitors.



You have never heard of either ceramic condensers or tantalum capacitors, but (fortunately) you have taken managerial economics. You can therefore make a good impression on your boss by making the following statement.

a. **Yes, ceramic condensers are important substitutes for tantalum capacitors.****
b. Yes, ceramic condensers are important complements for tantalum capacitors.
c. Yes, ceramic condensers are an important input used in producing tantalum capacitors.
d. I have to go to the washroom.

2. The demand function for gasoline (in millions of gallons per day) in the United States is
$Q_G = 675 - 75P_G + 5P_E$ where P_G is the price of a gallon of gasoline and P_E is the price of a gallon of corn-based ethanol, a fuel produced from corn. The supply function for gasoline in the US (in millions of gallons per day) is $Q_G = -400 + 200P_G$. The price of ethanol is $5. Find the equilibrium price and quantity of gasoline.

   a. P_G=$2, Q_G=100
   b. P_G=$3, Q_G=200
   c. **P_G=$4, Q_G=400****
   d. P_G=$5, Q_G=600

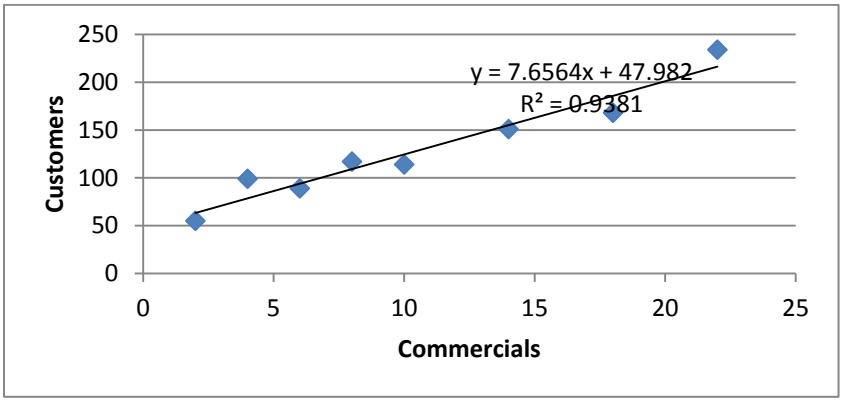
3. Corn is the main input in corn tortillas. It is also the main input in corn-based ethanol, which can be used as a fuel for automobiles. A tax is imposed on gasoline, which raises the price of gasoline. Which of the following statements best describes the effect of this tax:

   a. Gasoline and ethanol are complements. The tax will decrease demand for ethanol, decrease the price of corn, and decrease the price of corn tortillas.
   b. Gasoline and ethanol are substitutes. The tax will decrease demand for ethanol, decrease the price of corn, and decrease the price of corn tortillas.
   c. Gasoline and ethanol are complements. The tax will increase demand for ethanol, increase the price of corn, and increase the price of corn tortillas.
   d. **Gasoline and ethanol are substitutes. The tax will increase demand for ethanol, increase the price of corn, and increase the price of corn tortillas.****

4. Using focus group data we have used regression analysis to estimate the annual demand in Greater Vancouver for the Toyota Corolla. The estimated regression line suggests if price rose 20% from its current level then annual sales would drop from 21,000 to 19,000 vehicles. Which of following statements is true?

   a. Estimated demand is elastic for this price change.
   b. **Estimated demand is inelastic for this price change.****
   c. We do not have enough information to assess whether demand is elastic or inelastic.
   d. Toyota could raise Corolla-based revenues in the Vancouver area by lowering prices.

5. The following regression line shows an estimated relationship between demand (number of customers) and the amount of advertising (number of commercials) for a local restaurant chain. Which statement is true?

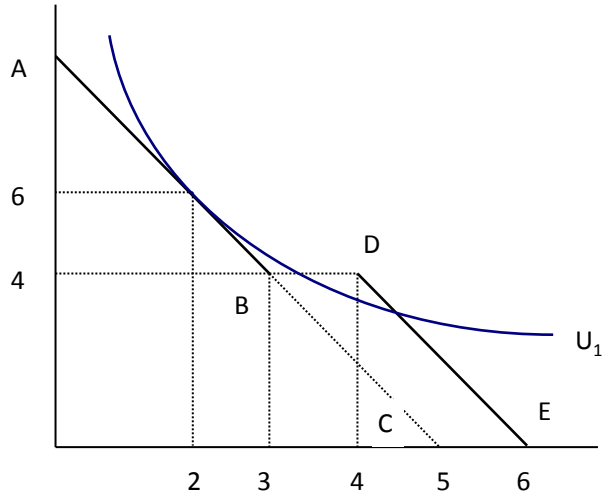


a. It was a mistake to use a linear form for the regression line as some of the points do not lie on the line.
b. **One additional commercial would be expected to bring in about 7 or 8 additional customers.****
c. The R^2 indicates that the estimated regression line has a slope of almost 1.
d. The regression line suggests that even with no commercials the restaurant would still expect to bring in more than 50 customers.

6. Julia is currently consuming goods X and Y and is spending the entire budget available for these two goods. At her current level of consumption we observe that MUx /Px > MUy /Py. Suppose Julia has standard indifference curves (bowed in toward the origin) and wants to maximize utility.

    a. She should increase her consumption of Y.
    b. **She should increase her consumption of X.****
    c. She should keep her consumption pattern unchanged if Px > Py.
    d. We do not have enough information to know what Julia should do.

7. The following diagram shows some budget lines and an indifference curve. Line AC is Alan's original budget line, ABDE is his budget line after a "buy-one-get-one free" (BOGOF) promotion is introduced, and U_1 is one of his indifference curves. His other indifference curves have the same general shape.



Given the situation illustrated in the diagram and with the BOGOF promotion in place,

    a. Alan maximizes utility at X =2 and Y = 6 and therefore does not take advantage of the promotion.

b. **Alan buys 3 units of X, 4 units of Y, and gets one unit of X free to maximize utility. ****
c. The maximum level of utility the consumer can get is given by the indifference curve U_1.
d. The promotion induces the consumer to buy only X and no Y.

8. Which of the following statements about the marginal productivity of labour (MP_L) and average productivity of labour (AP_L) is true?

a. When the AP_L curve is falling, the MP_L curve must also be falling.
b. Technological progress will cause the MP_L to fall for any given level of L.
c. If the production function is Q = aK + bL, the average product of labour equals the marginal product of labour for any value of L.
d. **If the AP_L is decreasing then $MP_L < AP_L$. ****

9. The production of Widgets (W) is given by W=KL. The production function for Gidgets (G) is given by $G=K+L^2$. Which of the following statements is true?

a. Both W and G have decreasing returns to scale.
b. Both W and G have constant returns to scale.
c. **Both W and B have increasing returns to scale.****
d. None of the above.

10. Your uncle gave you a truck from his seafood business and you already spent $400 cleaning it. If you spend an additional $2000 on repairs you can drive it to school for the year. Alternatively, your friend offers to rent it from you for the year, and will pay you $2000 immediately without requiring you to do any repairs. What is the opportunity cost of using the truck to drive to school for the year?

a. $2000
b. $2400
c. **$4000****
d. $4400

11. The table below gives a firm's optimal mix of labor and capital for each production quantity. The wage rate is $1 and the rental rate of capital is $2. Which of the following best describes the firm's cost function over the output range Q=1 to Q=6:

Q	L	K
0		
1	4	4
2	4	5
3	6	6
4	8	8
5	11	12
6	16	16

a. **There are economies of scale from Q=1 to Q=3, constant average cost (or constant economies) in moving from Q =3 to Q=4, and diseconomies of scale for Q > 4. ****
b. There are economies of scale at Q=1, constant average cost (or constant economies) at Q=2, and diseconomies of scale for Q > 2.
c. There are economies of scale from Q=1 to Q=4 and constant average cost (or constant economies) in moving from Q=5 to Q = 6.
d. None of the above.

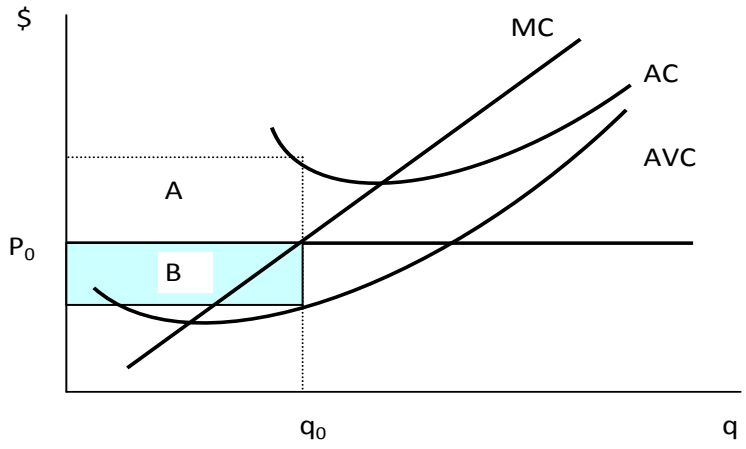
12. The textbook describes research done on company jets. It was found that when senior executives of a publicly traded corporation use company jets and that information is disclosed to shareholders, then the firm's stock price is likely to fall. Which of the following points is illustrated by this finding regarding company jets?

    a. Using company jets is often more efficient than having senior executives use commercial airlines.
    b. Allowing executives to use company jets helps align the objectives of shareholders and executives.
    c. **There are potential agency problems relating to conflicting objectives of shareholders and executives.****
    d. The corporate form has the advantage of allowing limited liability for shareholders.

13. We normally assume that firms maximize profits. However, there are several reasons why firms might sometimes fail to maximize profit. Which of the following considerations is likely to lead to failure to maximize profits?

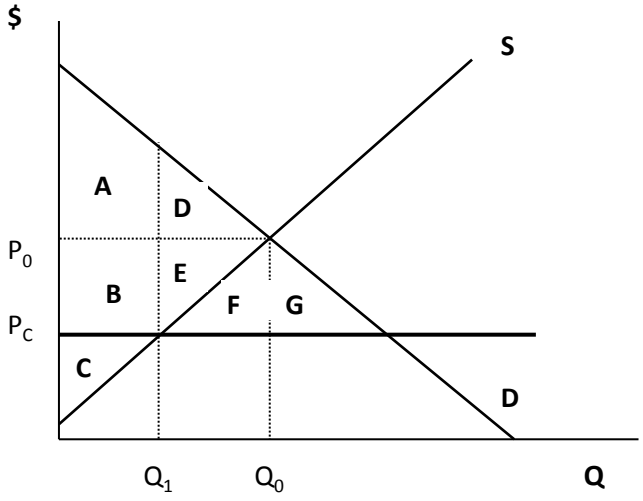
    a. The survivor principle, which means that unsuccessful firms go out of business.
    b. **Senior executives might pursue their own gains rather than profits for shareholders.****
    c. Short run fixed costs might cause firms to make losses.
    d. All of the above.

14. A firm in a competitive market has the MC, AC and AVC functions as given in the following diagram. The competitive market equilibrium price is P_0. Which of the following statements is true?



a. The firm suffers a loss equal to area A and hence shuts down in the short run (i.e., when the fixed cost is unavoidable).
b. Although the firm suffers a loss equal to area A, it continues producing in the short run.
c. The firm suffers a loss equal to area (A + B) if it shuts down (in the short run), which is larger than the loss it suffers if it continues producing.
d. **Both b and c.****

15. Consider a market for gasoline as shown in the following diagram.



Initially the price is at the free market equilibrium. The government then sets a price ceiling. The consumers who value the good most are able to buy it after the price

ceiling is imposed. If the government sets the price ceiling at P_C (below the free-market equilibrium price P_0), then

a. The gain in consumers' surplus is area (B - D).
b. The gain in consumers' surplus is area (B + E + F).
c. The loss in producers' surplus is higher than the gain in consumers' surplus.
d. **Both a and c.****

16. Which of the following markets is most likely to resemble a perfectly competitive market?

a. **Many companies produce white socks and consumers consider all white socks as identical.****
b. Scholastic Inc. owns the Canadian copyright for the COMM 295 textbook used at UBC.
c. Many stores in the mall sell hats. Each store's hat reflects the style of that particular store.
d. Both a. and c.

17. Which of the following is likely to **prevent** the unicycle industry from becoming a monopoly?

a. High costs of entering the industry.
b. The need for a special government license to produce unicycles.
c. A patent on the low-cost method of producing unicycles.
d. **None of the above.****

18. Suppose a monopolist has (inverse) demand function P=20-Q and cost function C(Q)=10Q. At the profit maximizing output:

a. Q=15
b. The point elasticity of demand is -1
c. **The point elasticity of demand is -3. ****
d. P=5

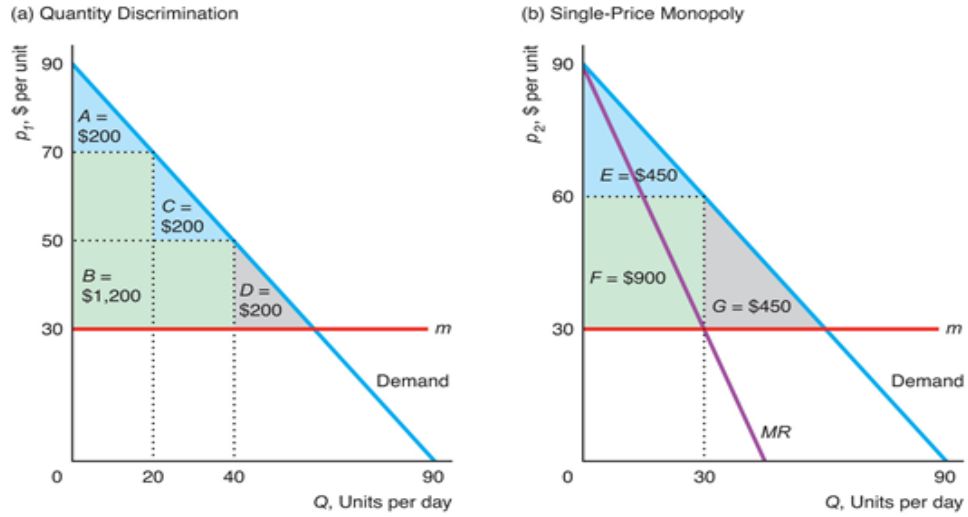
19. The Green Mountain Café is a high quality restaurant. It is considering offering a package deal consisting of a main course (baked salmon) and dessert (chocolate mousse). Alternatively, the restaurant could just sell these items on a stand-alone basis. A patron could buy either a main course, or dessert, or both. There are three types of customers, Type A, Type B, and Type C. They are equally numerous.

Their willingness to pay is as follows. Assume that marginal cost is zero and can be ignored.

	Main Course	Dessert
Type A Consumers	30	5
Type B Consumers	25	10
Type C Consumers	20	15

a. If (pure) bundling is used, the revenue-maximizing price is $35 for the bundle.
b. If stand-alone pricing is used, the revenue-maximizing prices are $20 for the main course and 10 for the dessert.
c. Pure bundling generates more revenue than stand-alone pricing.
d. **All of the above.****

20. A consumer has a demand curve given by P = 90 – Q. In the following diagram, panel (a) shows the consequences of quantity-based price discrimination if the firm charges $70 each for the first 20 units and $50 each for any additional units. Panel (b) illustrates profit-maximizing uniform monopoly pricing. The red line shows marginal cost. Identify the correct statement from the alternatives below.



a. **Revenue under quantity-based price discrimination exceeds revenue under uniform monopoly pricing by 600. ****
b. The average price paid is higher under quantity-based price discrimination than under uniform pricing.
c. Profits are higher with uniform monopoly pricing than with quantity-based price discrimination.
d. None of the above.

1. Consumer Choice Theory

A local fitness club charges $5 per visit to its customers. One of its customers, Albert, has a monthly budget of $100 to allocate between visits to the fitness club and other recreational activities. His utility function is given by $U= 2x^{0.5} y^{0.5}$, where x = number of visits/month to the club and y is the amount of other recreational activities. The price of other activities is $1 per unit.

a. Show that the ratio of the two goods that will maximize Albert's utility is X/Y = 1/5. Also, write down the equation of Albert's budget line. (8 pts)

b. How many times will Albert visit the fitness club each month? What happens to his visits if Albert's monthly recreation budget rises by 10% to $110 ? (7 pts)

a)

$MU_x = Y^{0.5}/X^{0.5}$ and $MU_y = X^{0.5}/Y^{0.5}$

$MRS = MU_x / MU_y = Y/X$

For utility maximization:

$MRS = P_x / P_y$

$Y/X = 5/1$

$\rightarrow$ $X/Y = 1/5$

Budget Line: $5X + Y = 100$

b) Substitute the value of $Y = 5X$ into the budget constraint $5X + Y = 100$ to get $Y = 50$ and $X = 10 \rightarrow$ Albert will visit the club 10 times a month.

Albert's new budget constraint is:

$5X + Y = 110$

Substitute the value of $Y = 5X$ from the condition for utility maximization into the budget constraint:

$5X + 5X = 110$

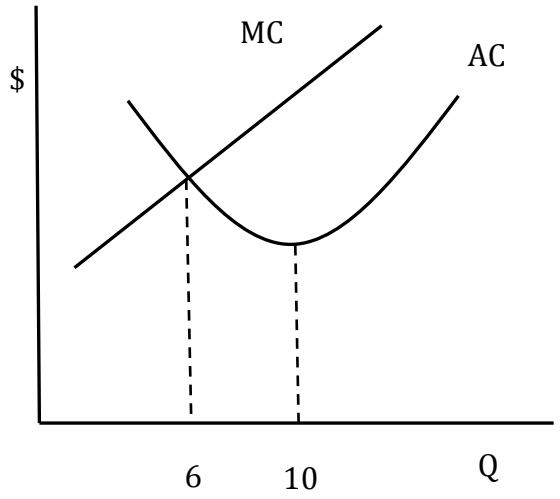
$10X = 110$

$X = 11$. Albert's visits to the club increases by 1 per month.

2. Production and Cost

a. A production process uses two inputs, Labour (L) and Capital (K), and can be written as Q=10LK where Q is the total output for a day. Labour costs $100 per unit and capital costs $100 per unit. Find the marginal product of labour and capital (MP_L and MP_K). It follows that the cost-minimizing ratio of capital to labour (K/L) is 1. Find the cost of producing an output of 360 units. (8 pts)

b. Average cost is given by AC = 20 - 8Q + Q^2. (Note: this is **average** cost, not total cost.) The following diagram has been provided by a new employee (who never took managerial economics) to illustrate the cost situation. What is wrong with the diagram? Identify 3 major problems. (Hint: Check the numbers.) (7 pts)



a)

$MP_L = dQ/dL = 10K$

$MP_K = dQ/dK = 10L$

K/L = 1 (**To find this ratio equate MP_L/MP_K = w/r, but this step is not necessary as K/L ratio is already given in the question**)

substituting K = L into Q = 10LK = 360

360 = 10KL

Therefore 360=10K^2 (or 10L^2)

K=6, L=6

Cost = 100K + 100L = 100(6) + 100(6) = $1200

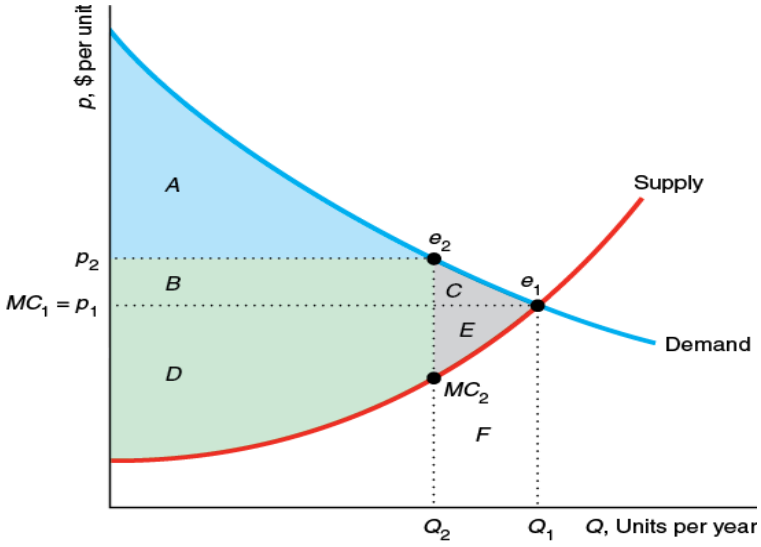
b)

1. MC = 20 - 16Q + 3Q^2. So MC is not linear.
2. MC = AC yields Q=4; Minimum of AC is at Q =4 not 6 or **10**
3. MC and AC must intersect at 4 **or** MC must intersect AC at the min of AC, **not at where AC is falling.**
4. MC is above AC and AC is still falling **or** AC is falling when MC is above AC.

3. Competition and Surplus

a. The long run total cost curve for a typical firm in the ceramic condenser industry is C = 900 – 10*q + q^2. The industry is perfectly competitive and all firms are identical. How much output does a typical firm produce in the long run equilibrium? What is the price? Briefly explain the logic of your analysis. (8 pts)

b. The following diagram illustrates the point that perfect competition is efficient in that it maximizes the sum of consumer and producer surplus (total surplus). (7 pts)



Briefly explain how we know that Q1 is the equilibrium output under perfect competition and, referring to the diagram, briefly explain the reasoning that allows us to conclude that total surplus is higher at Q1 than at Q2.

a).

C = 900 - 10*q + q^2.

At the long run equilibrium Profits are zero, so P = MC = AC

MC = -10 + 2q.

AC = 900/q - 10 + q.

Set MC = AC to obtain q = 30.

P = AC **or P = MC**

P = -10 + 2* 30 = 50

b)

We know that Q1 is the equilibrium output under perfect competition because

i) This is where supply = demand

ii) Under perfect competition P = MC, which occurs at this point, as MC is given by the supply curve.

At output Q1

CS = A + B + C

PS = D + E.
so the total surplus = A+B+C+D+E.

At output Q2
CS = A
PS = B+D.
The total surplus = A+B+D.

The total surplus at Q1 exceeds the total surplus at Q2 by the amount C+E, the deadweight loss

Better Answer
At Q2, the marginal value of each extra production (over Q2 but up to Q1) is higher than MC of production but those quantities are not produced and transacted in the market, leading to DWL.

4. Pricing with Market Power
a. A monopoly has marginal cost function MC=Q. All consumers are identical. The following table shows the willingness to pay of a typical consumer for successive units of the product (sometimes called the marginal willingness to pay or MWTP). Thus a consumer is willing to pay 12 for the 1st unit, 9 for the 2nd, etc.

Q	MWTP
0	
1	12
2	9
3	7
4	6
5	5
6	4

If the monopolist is allowed to use two-part pricing, what will it charge as the access fee and what will it charge as the per-unit price? (Explain your reasoning.) (8 pts)

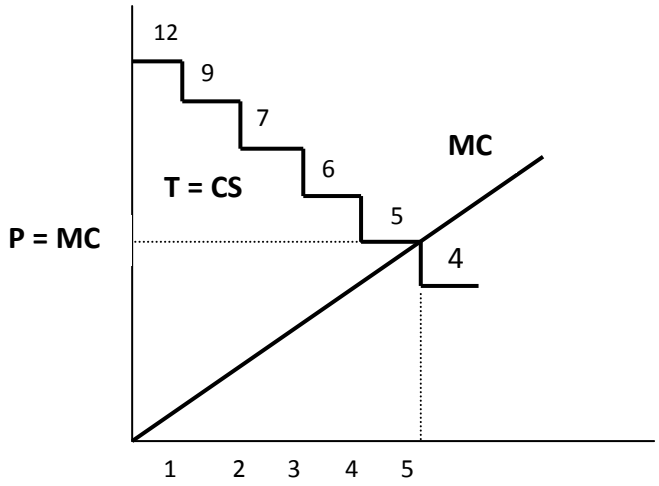
b. Nikon has a monopoly for a particular type of high quality digital cameras used by newspapers. The marginal cost of production is constant at $200. Demand in Canada is Q=1000-2P while demand in the United States is Q=5000-4P. If Nikon can use multi-group price discrimination, what prices would it charge in Canada and in the U.S.? Would you anticipate any problems that might limit the ability of Nikon to price discriminate in this way? (7 pts.)

a) At Q = 5, consumer's MWTP = MC = $5 (Note MC = Q). Therefore usuage fee (per unit price) under two part tariff, P = $5. The consumer's surplus at P=$5 is the difference between MWTP and P for each quantity: 7+4+2+1+0=$14. **The monopolist sets the access fee T = $14 and P = $5.** With this pricing, the monopolist can extract all surpluses such that both CS and DWL are zero.

(Note: You may construct a table as below or draw a diagram to figure this out, but not necessary)

Q	MWTP	MC = Q	CS = MWTP- P
0			
1	12	1	12-5 =7
2	9	2	9-5=4
3	7	3	7-5=2
4	6	4	6-5=1
5	**5**	**5**	5-5=0
6	4	6	**Total CS = $14**

You may draw a diagram as below:



b)

Canada:

Q=1000-2P

P = 500 - 0.5Q

MR = 500 - Q

Set MR = MC for profit maximization

500 - Q = 200

Q_C = 300 and P_C = 500 - 0.5*300 = $350.

US:

$Q=5000 - 4P$

$P = 1250 - 0.25Q$

$MR =1250 - 0.5Q$

Set MR = MC

$1250 - 0.5Q = 200$

$Q_{US}= 2100$ and $P_{US} = 1250 - 0.25*2100 = \$725.$

The cross-border trade/resale (specifically buy at $350 in Canada and resale at $725 in the US) and Americans purchasing online from Canada are two major problems that can limit Nikon's ability to price discriminate in this way.