FE341: Microeconomics
Homework 6
Due November 22nd

1. From the textbook page 420: Chapter 11 Exercises #2

True. This is a two-part tariff where the entry fee is a charge for the car plus the driver and the usage fee is a charge for each additional passenger other than the driver. Assuming that the marginal cost of showing the movie is zero (so all costs are fixed and do not vary with the number of cars), the theater should set its entry fee to capture the consumer surplus of the driver, a single viewer and should charge each passenger a positive price (P > MC).

2. From the textbook page 420: Chapter 11 Exercises #4

a) In Europe:
$MR_E = MC$ à so we need TR_E
we know $Q_E = 4{,}000{,}000 - 10P_E$ à $P_E = 400{,}000 - (1/10)Q_E$
so $TR_E = P_E*Q_E = 400{,}000Q_E - (1/10)Q_E^2$
so $MR_E = dTR_E/dQ_E = 400{,}000 - (1/5)Q_E = 20{,}000 = MC$ à solving for Q_E
$Q_E = 1{,}900{,}000$
$P_E = 400{,}000 - (1/10)(1{,}900{,}000) = \$210{,}000$

In US:
$MR_U = MC$ à so we need TR_U
we know $Q_U = 1{,}000{,}000 - 20P_U$ à $P_U = 50{,}000 - (1/20)Q_U$
so $TR_U = P_U*Q_U = 50{,}000Q_U - (1/20)Q_U^2$
so $MR_U = dTR_U/dQ_U = 50{,}000 - (1/10)Q_U = 20{,}000 = MC$ à solving for Q_U
$Q_U = 300{,}000$
$P_U = 50{,}000 - (1/20)(300{,}000) = \$35{,}000$

Total Profits are $TR - TC = P_EQ_E + P_UQ_U - (10{,}000{,}000{,}000 + 20{,}000(Q_E+Q_U)) =$
Profits = 210,000*1,900,000 + 35,000*300,000 - 10,000,000,000 - 20,000(2,200,000)) =
4,000,000,000

b) If there is only 1 market price for both Europe and the US: $Q = Q_E + Q_U$ à
$Q = 5{,}000{,}000 - 120\,P$. The inverse demand is $P = 5{,}000{,}000/120 - (1/120)Q$.
Therefore, so $TR = P*Q = (5{,}000{,}000/120)Q - (1/120)Q^2$
so $MR = dTR/dQ = 5{,}000{,}000 - (1/60)Q = 20{,}000 = MC$ à solving for Q
Q = 1,300,000
$P = 5{,}000{,}000 - (1/120)(1{,}300{,}000) = \$30{,}833.33$
Now profits = 4,083,333,330 (lower than with price discrimination)

3. From the textbook page 421: Chapter 11 Exercises #7

The logic is that the firm allows consumers to sort themselves into two groups: high-demand users (more than 20 movies) and low-demand users (less than 20 movies). If only a two-part tariff is offered, a high entry fee with a low rental fee discourages low-demand users; while a low entry fee with a high rental fee encourages membership by may decrease the amount of movies high-demanders rent.

4. From the textbook page 469: Chapter 12 Exercises #3

a) profit maximizing price and quantity: find Q where MC = MR à
MR = 53 2Q = 5 = MC, so Q = 24; P = 53 Q = 53 24 = $29; profits = $576

b) Now $Q = Q_1 + Q_2$ à This changes profits (and MR for each firm):
$Profit_1 = P*Q_1 MC_1Q_1 = (53 Q_1 Q_2)Q_1 5Q_1$

$Profit_2 = P*Q_2 MC_2Q_2 = (53 Q_1 Q_2)Q_2 5Q_2$

c) $dprofit/dQ_1 = 53 2Q_1 Q_2 5 = 0$
(alternatively MR = 53 $2Q_1$ $Q_2 = 5 = MC$)
So $Q_1 = 24 ½ Q_2$ (we call this a "best response function" or reaction function for firm 1)

By symmetry:
$Q_2 = 24 ½ Q_1$

d) Simultaneously solving: $Q_1 = 24 ½ (24 ½ Q_1)$ à $Q_1 = 16$ and by symmetry $Q_2 = 16$, P = 53 Q_1 Q_2 = $21; profits for each firm are $256 (so $512 for the industry)