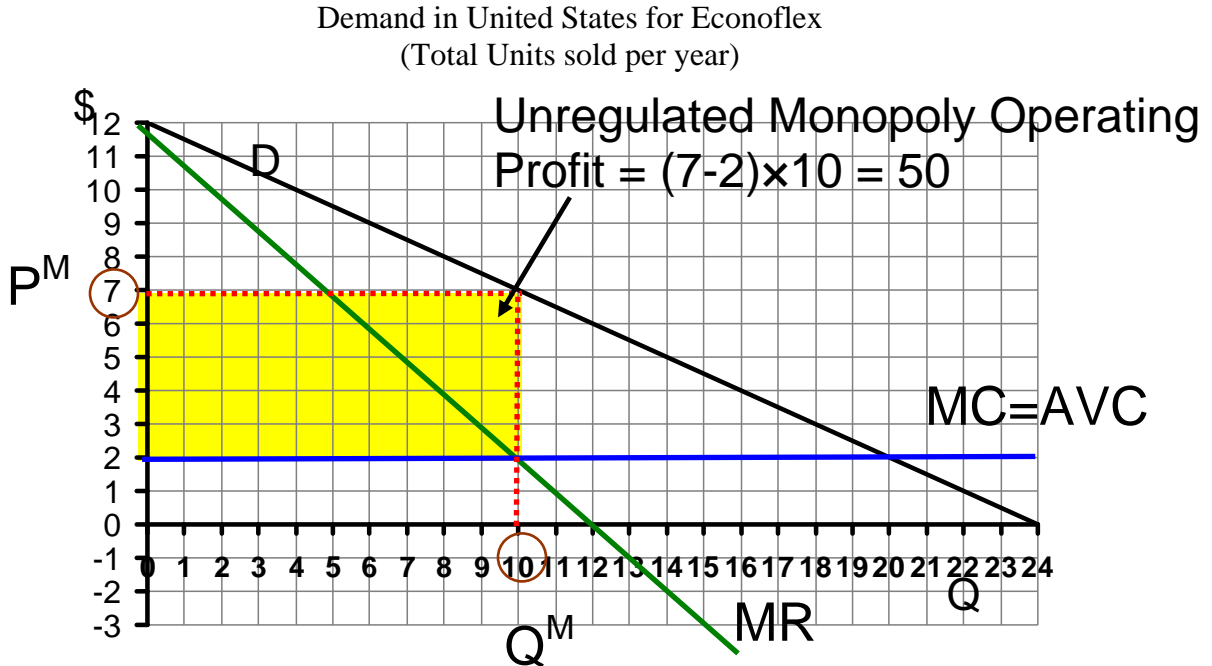Econ 1101

Solution to Recitation Problem on Intellectual Property Protection in the Global Economy

Note: This is the answer sheet for a practice question.   See Reading 7 for background.

Demand in United States for Econoflex
(Total Units sold per year)

1. The Big Pharma Corporation is considering developing a new drug Econoflex. The demand curve for the drug in the United States is illustrated above. This shows how the quantity sold per year varies with the price. Suppose the marginal cost to produce one unit of Econoflex is $2. (This also equals average variable cost.)

In this problem, we will analyze the incentive for Big Pharma to innovate and develop the drug. We will consider two possibilities for the fixed cost, $40 or $60. We will consider two possibilities for the patent system. In the "weak patent regime," Big Pharma can get a patent, but it only lasts one year. After the year is over, the patent expires, generic competitors show up, and price falls to marginal cost, P=$2. In the "strong patent regime," patents last for two years.

For the first step of your analysis, figure out what happens if the firm develop the drug. Calculate the operating profits the firms achieves and how operating profits depend upon whether patents last one year or two years. Recall that operating profits equal revenue less variable costs. Fill out the information in Table 1 below. (The variable "Total Market Quantity" includes sales of any generics that might be sold in the second year if the patent lasts only one year.)

Answer: Draw the marginal revenue and marginal cost curves above. Setting MR=MC, the monopoly quantity is 10 units and the price is P=7. This yields operating profit equal to $(7-2)\times 10 = 50$.

Table 1
How Operating Profits Depend on the Patent Regime.

	Patent Lasts One Year	Patent Lasts Two Years
Price (year 1)	7	7
Total Market Quantity (year 1)	10	10
Operating Profit (year 1)	50	50
Price (year 2)	2	7
Total Market Quantity (year 2)	20	10
Operating Profit (year 2)	0	50
Operating Profit over two years	50	100

Suppose that Big Pharma will innovate and develop the drug if operating profits added up over two years (the last row above) exceed the fixed cost of innovation. The table below has a separate column for each of the four possible fixed cost/patent type scenarios. Fill out the table.

Table 2: How the Outcome Depends upon Fixed Cost and the Patent Regime

	Patent Lasts One Year		Patent Lasts Two Years	
Fixed Cost	40	60	40	60
Is Econflex Developed?	yes	no	yes	yes
Consumer Surplus (year 1)	25	0	25	25
Consumer Surplus (year 2)	100	0	25	25
Consumer Surplus over two years	125	0	50	50
Big Pharma Profit over two years on Econoflex (Operating profit net of any fixed cost)	10	0	60	40
Total Surplus over two years.	135	0	110	90

What lessons can we draw from Table 2?

Answer: When fixed cost is low, the drug will be developed even with a low level of patent protection. In this case raising the patent length to two years lowers total surplus from 135 to 110. This is because we get monopoly for two years rather than one year (and so twice the deadweight loss of monopoly).

When fixed cost is high, the drug is only invented when there is strong patent protection. In this case, lengthening the patent benefits consumers and the firm (and raises total surplus.)

2, Let's continue the problem but now add Europe. Suppose the people in Europe can also be treated with Econoflex. Make the following additional assumptions.

- The demand curve in Europe is identical to the demand curve for the United States illustrated above.
- Europe practices **drug price regulation.** In Europe, the price of Econoflex is required to be no higher than $3.
- Big Pharma is able to **price discriminate** and set a higher price in the U.S. than it does in Europe.

- Patents are recognized in both the United States and Europe, but patents only last one year in both places.

Fill out the table below.

Table 3
What happens if the drug is developed?
(Assume patent lasts only one year)

Price in U.S.	7
Quantity in US.	10
Operating Profit in U.S.	50
Price in Europe	3
Quantity in Europe	18
Operating Profit in Europe	18
Total Operating Profit	68

(a) Suppose the fixed cost to develop the drug is $60. If Big Pharma can price discriminate, will it develop the drug? Why or why not?

Yes. With price discrimination, the firm can generate $68 in operating profit. This exceeds the fixed cost of the investment, to the drug is developed.

(b) Suppose it is impossible to price discriminate. When Big Pharma tries setting a $3 price in the Europe and a higher price in the U.S., people in Europe buy it for $3 there and resale it on eBay. (Suppose there is a lot of competition on eBay so in this case, U.S. consumers can get it for close to the $3 price that Europeans are paying.) Therefore, if it want to sell the drug in Europe at the $3 price, it will have to the drug for $3 in both places. If the fixed cost is $60 and price discrimination is impossible, will Big Pharma develop the drug? Why or why not?

No. The drug won't be developed. If resales are possible, if the firm tries to sell in Europe, it will have to set the price equal to $3 in both markets. This generates $18 in operating profit in each market or a total of $36 in operating profit. This does not cover the $60 in fixed cost, so the drug will not be developed. This is an example where price discrimination can actually help U.S. consumers because if the firm can price this way, the drug will be developed. U.S. consumers won't be able to buy the drug at any price if price discrimination is impossible.