

**EE211 Section 1
Homework 5 Answers**

Explain your answers with graph in details.

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Chapter 16

Problems and Applications # 1,3, 4 and 5

1. The following table shows revenue, costs, and profits:

Price	Quantity	Total Revenue	Marginal Revenue	Total Cost	Profit
\$100	0	\$0	----	\$2,000,000	\$-2,000,000
90	100,000	9,000,000	\$90	3,000,000	6,000,000
80	200,000	16,000,000	70	4,000,000	12,000,000
70	300,000	21,000,000	50	5,000,000	16,000,000
60	400,000	24,000,000	30	6,000,000	18,000,000
50	500,000	25,000,000	10	7,000,000	18,000,000
40	600,000	24,000,000	-10	8,000,000	16,000,000
30	700,000	21,000,000	-30	9,000,000	12,000,000
20	800,000	16,000,000	-50	10,000,000	6,000,000
10	900,000	9,000,000	-70	11,000,000	-2,000,000
0	1,000,000	0	-90	12,000,000	-12,000,000

- A family profit-maximizing publisher would choose a quantity of 400,000 at a price of \$60 or a quantity of 500,000 at a price of \$50; both combinations would lead to profits of \$18 million.
- Marginal revenue is less than price. Price falls when quantity rises because the demand curve slopes downward, but marginal revenue falls even more than price because the firm loses revenue on all the units of the good sold when it lowers the price.
- Figure A shows the marginal-revenue, marginal-cost, and demand curves. The marginal-revenue and marginal-cost curves cross between quantities of 400,000 and 500,000. This signifies that the firm maximizes profits in that region.

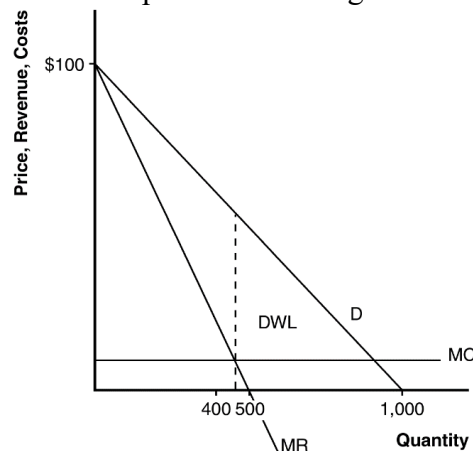


Figure A

- d. The area of deadweight loss is marked “DWL” in the figure. Deadweight loss means that the total surplus in the economy is less than it would be if the market were competitive, because the monopolist produces less than the socially efficient level of output.
- e. If the author were paid \$3 million instead of \$2 million, the publisher would not change the price, because there would be no change in marginal cost or marginal revenue. The only thing that would be affected would be the firm’s profit, which would fall.
- f. To maximize economic efficiency, the publisher would set the price at \$10 per book, because that is the marginal cost of the book. At that price, the publisher would have negative profits equal to the amount paid to the author.

3.

- a. The following table shows total revenue and marginal revenue for each price and quantity sold:

Price	Quantity	Total Revenue	Marginal Revenue	Total Cost	Profit
24	10,000	\$240,000	----	\$50,000	\$190,000
22	20,000	440,000	\$20	100,000	340,000
20	30,000	600,000	16	150,000	450,000
18	40,000	720,000	12	200,000	520,000
16	50,000	800,000	8	250,000	550,000
14	60,000	840,000	4	300,000	540,000

- b. Profits are maximized at a quantity where MR=MC. The quantity at which MC is closest to MR without exceeding it is 50,000 albums at a price of \$16. At that point, profit is \$550,000.
- c. As Swift’s agent, you should recommend that she demand \$550,000 from them, so she receives all of the profit (rather than the record company). The firm would still choose to produce 50,000 albums because their marginal cost would not change.

4.

- a. The table below shows total revenue and marginal revenue for the bridge. The profit-maximizing price will occur at the quantity at which marginal revenue equals marginal cost. In this case, marginal cost equals zero, so the profit-maximizing quantity occurs where marginal revenue equals 0. This occurs at a price of \$4 and quantity of 400,000 crossings. The efficient level of output is 800,000 crossings, because that is where price is equal to marginal cost. The profit-maximizing quantity is lower than the efficient quantity because the firm is a monopolist.

Price	Quantity (in Thousands)	Total Revenue (in Thousands)	Marginal Revenue
\$8	0	\$0	----
7	100	700	\$7

6	200	1,200	5
5	300	1,500	3
4	400	1,600	1
3	500	1,500	-1
2	600	1,200	-3
1	700	700	-5
0	800	0	-7

- b. The company should not build the bridge because its profits are negative. The most revenue it can earn is \$1,600,000 and the cost is \$2,000,000, so it would lose \$400,000.
- c. If the government were to build the bridge, it should set price equal to marginal cost to be efficient. Since marginal cost is zero, the government should not charge people to use the bridge.
- d. Yes, the government should build the bridge, because it would increase society's total surplus. As shown in Figure B, total surplus has area $\frac{1}{2} \times 8 \times 800,000 = \$3,200,000$, which exceeds the cost of building the bridge.

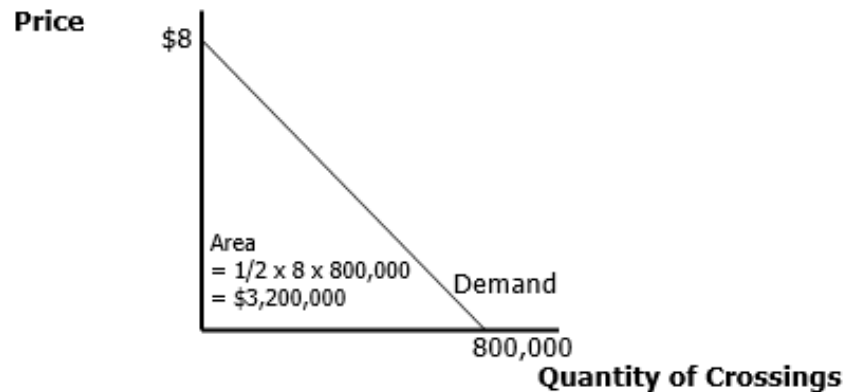


Figure B

5.
a.

A monopolist always produces a quantity at which demand is elastic. If the firm produced a quantity for which demand was inelastic and the firm raised its price, quantity would fall by a smaller percentage than the rise in price, so revenue would increase. Because costs would decrease at a lower quantity, the firm would have higher revenue and lower costs, so profit would be higher. Thus the firm should keep raising its price until profits are maximized, which must happen on an elastic portion of the demand curve.

b.

As Figure C shows, another way to see this is to note that on an inelastic portion of the demand curve, marginal revenue is negative. Increasing quantity requires a greater percentage reduction in price, so revenue declines. Because a firm maximizes profit where marginal cost equals marginal revenue, and marginal cost is never negative, the profit-maximizing quantity can never occur where marginal revenue is negative. Thus, it can never be on the inelastic portion of the demand curve. Total revenue is maximized where marginal revenue is equal to zero (Q_{TR} on Figure C).

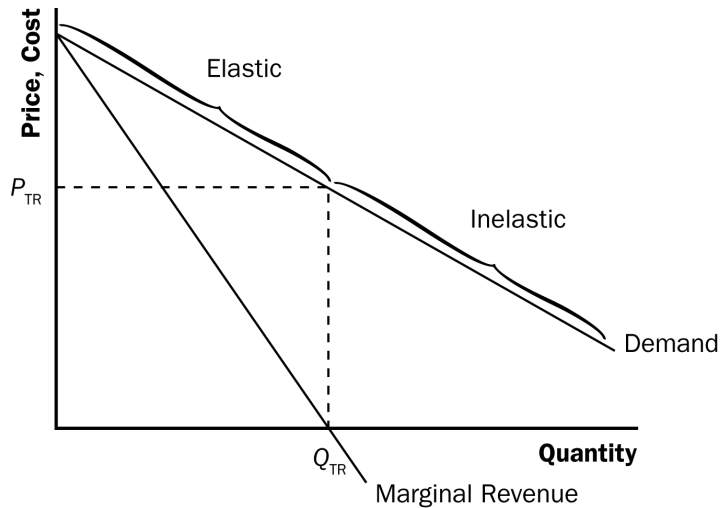


Figure C

Chapter 19
Problems and Applications # 1, 2, and 3

1.
 - a. The law requiring people to eat one apple a day increases the demand for apples. As shown in Figure A, demand shifts from D_1 to D_2 , increasing the price from P_1 to P_2 , and increasing quantity from Q_1 to Q_2 .

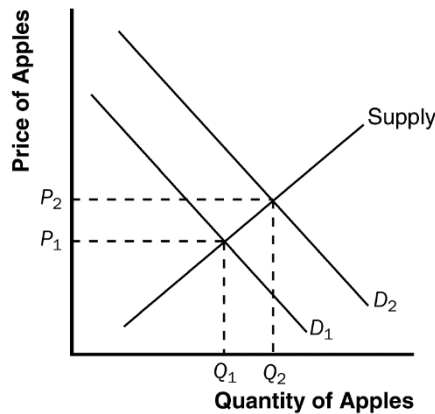


Figure A

- b. Because the price of apples increases, the value of the marginal product increases for any given quantity of labor. There is no change in the marginal product of labor for any given

quantity of labor. However, firms will choose to hire more workers and thus the marginal product of labor at the profit-maximizing level of labor will be lower.

- c. As Figure B shows, the increase in the value of the marginal product of labor shifts the demand curve of labor from D_1 to D_2 . The equilibrium quantity of labor rises from L_1 to L_2 , and the wage rises from w_1 to w_2 .

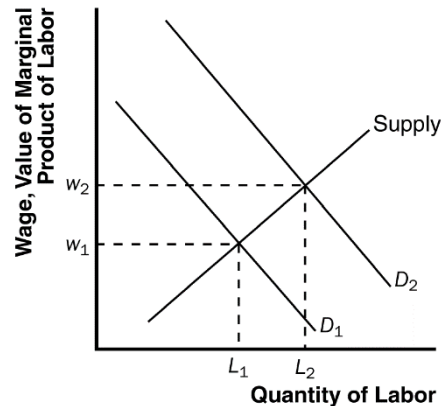


Figure B

2.

- a. If Congress were to buy personal computers for all U.S. college students, the demand for computers would increase, raising the price of computers and thus increasing the value of the marginal product of workers who produce computers. This is shown in Figure C as a shift in the demand curve for labor from D_1 to D_2 . The result is an increase in the wage from w_1 to w_2 and an increase in the quantity of labor from L_1 to L_2 .

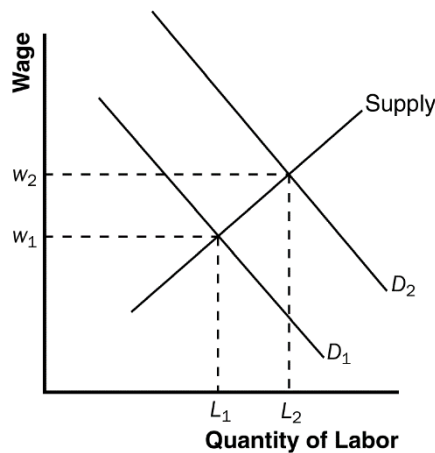


Figure C

- b. If more college students major in engineering and computer science and assuming this trend does not affect the demand for computers, the supply of labor in the computer industry rises. This is shown in Figure D as a shift in the supply curve from S_1 to S_2 . The result is a decrease in the wage from w_1 to w_2 and an increase in the quantity of labor from L_1 to L_2 .

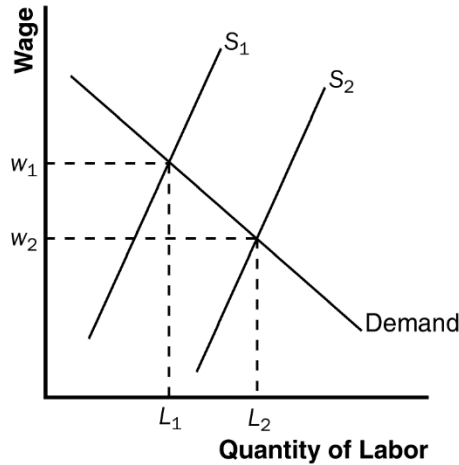


Figure D

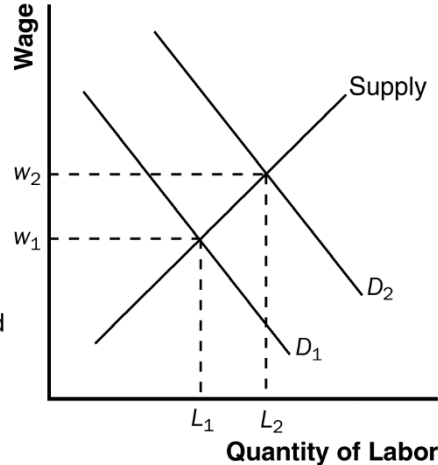


Figure E

- c. If computer firms build new manufacturing plants, this increases the marginal product of labor and the value of the marginal product of labor for any given quantity of labor. This is shown in Figure E as a shift in the demand curve for labor from D_1 to D_2 . The result is an increase in the wage from w_1 to w_2 and an increase in the quantity of labor from L_1 to L_2 .

3.

- a. The marginal product of labor is equal to the additional output produced by an additional unit of labor. The table below shows the marginal product of labor (MPL) for this firm:

Days of Labor	Units of Output	MPL	$VMPL$
0	0	--	--
1	7	7	70
2	13	6	60
3	19	6	60
4	25	6	60
5	28	3	30
6	29	1	10
7	29	0	0

- b. The value of the marginal product of labor ($VMPL$) is equal to the price of the output (\$10) multiplied by the marginal product of labor (MPL). It is also reported in the table.
- c. The labor demand schedule for the firm is:

Wage	Quantity of Labor Demanded
\$0	7
10	6
30	5
60	4
60	3
60	2
70	1

- d. The labor demand curve is the same as the value-of-the-marginal-product curve. It is shown in Figure F.

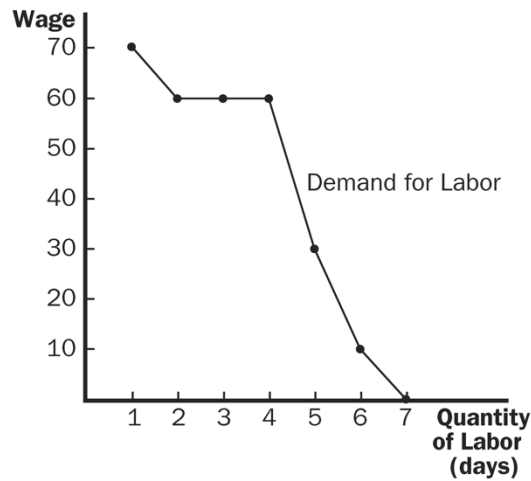


Figure F

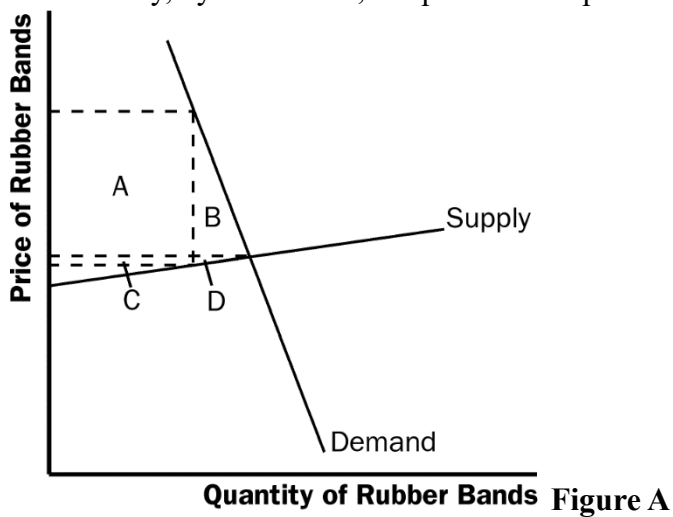
- e. If the price of the output rises to \$12, the demand for labor will shift to the right because the value of the marginal product will be higher at each level of labor hired.

Chapter 8

Problems and Applications # 3

3.

- a. With very elastic supply and very inelastic demand, the burden of the tax on rubber bands will be borne largely by buyers. As Figure A shows, consumer surplus declines considerably, by area A + B, but producer surplus decreases only by area C + D.



- b. With very inelastic supply and very elastic demand, the burden of the tax on rubber bands will be borne largely by sellers. As Figure B shows, consumer surplus does not decline much, just by area A + B, while producer surplus falls substantially, by area C + D. Compared to part (a), producers bear much more of the burden of the tax, and consumers bear much less.

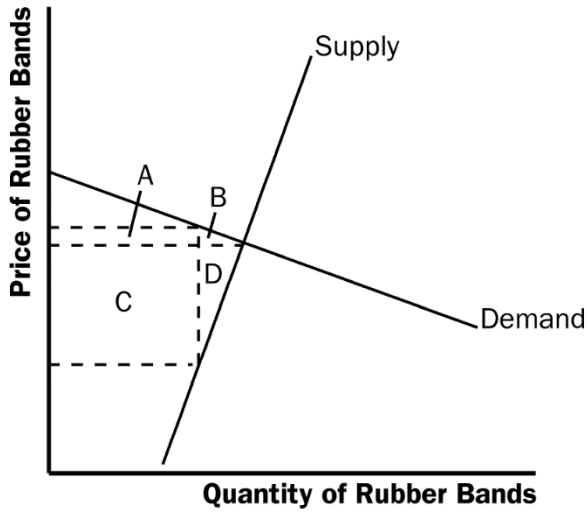


Figure B