

**PROBLEM SET 1 ANSWERS, revised**  
**G300, Fall 1999**  
**September 20, 1999**  
**Professor Rasmusen**

CHAPTER 1.

3. (a) Option A has the highest first-year profits, but the lowest second and third year profits. Option B earns less in the first year than A, but more in years two and three. Option C has the lowest first year profits, but the greatest profits in years two and three. Option A might represent a low current advertising budget; it doesn't cost much today (and thus current profits are relatively high). However, a low current advertising budget does not increase future profits as much as a moderate (Option B) or an intensive (Option C) level of current advertising budget.
- (b)  $PV_A = 70,000/(1.08) + 80,000/(1.08)^2 + 90,000/(1.08)^3 = \$204,846.82.$   
 $PV_B = 50,000/(1.08) + 90,000/(1.08)^2 + 100,000/(1.08)^3 = \$202,840.01.$   
 $PV_C = 30,000/(1.08) + 100,000/(1.08)^2 + 115,000/(1.08)^3 = \$204,802.37.$
- Option A has the highest present value.
4. (a) Accounting costs equal \$200,000 per year in rent plus other operating expenses.
- (b) Opportunity costs equal \$235,000 per year plus other operating expenses.
- (c) In order to earn positive accounting profits, the revenues per year should be greater than \$200,000 plus other operating expenses per year. In order to earn positive economic profits, the revenues per year should be greater than \$235,000 plus other operating expenses per year.

5.

(1) Control Variable Z	(2) Total Benefits B(Z)	(3) Total Costs C(Z)	(4) Net Benefits N(Z)	(5) Marginal Benefit MB(Z)	(6) Marginal Cost MC(Z)	(7) Marginal Net Benefit MNB(Z)
0	0	0	0	--	--	--
1	200	10	190	200	10	190
2	380	30	350	180	20	160
3	540	60	480	160	30	130
4	680	100	580	140	40	100
5	800	150	650	120	50	70
6	900	210	690	100	60	40
7	980	280	700	80	70	10
8	1,040	360	680	60	80	-20
9	1,080	450	630	40	90	-50
10	1,100	550	550	20	100	-80

(a)  $Z = 7$  maximizes net benefits.

(b) Marginal cost is a little bit smaller than marginal benefit ( $MC = 70$ ,  $MB = 80$ ). This is due to the discrete nature of the control variable.

8. (a) Setting  $MNB(Q) = 3000 - 20Q = 0$  and solving for  $Q$  yields  $Q = 150$ .

(b) Marginal benefit at  $Q = 150$  is 600.

(c) Marginal cost at  $Q = 150$  is  $4(150) = 600$ .

(d) Net Benefits are  $3,000Q - 8Q^2 - (100 + 2Q^2)$ . When  $Q = 150$ , net benefits are \$224,900.

(e) "Net benefits" mean profits.

9. The maximum amount you should be willing to pay is the present value of the income stream generated from the bond. This amount is \$1,168.49, since

$$\frac{100}{1.06} + \frac{100}{(1.06)^2} + \frac{100}{(1.06)^3} + \frac{100}{(1.06)^4} + \frac{1100}{(1.06)^5} = \$1,168.49.$$

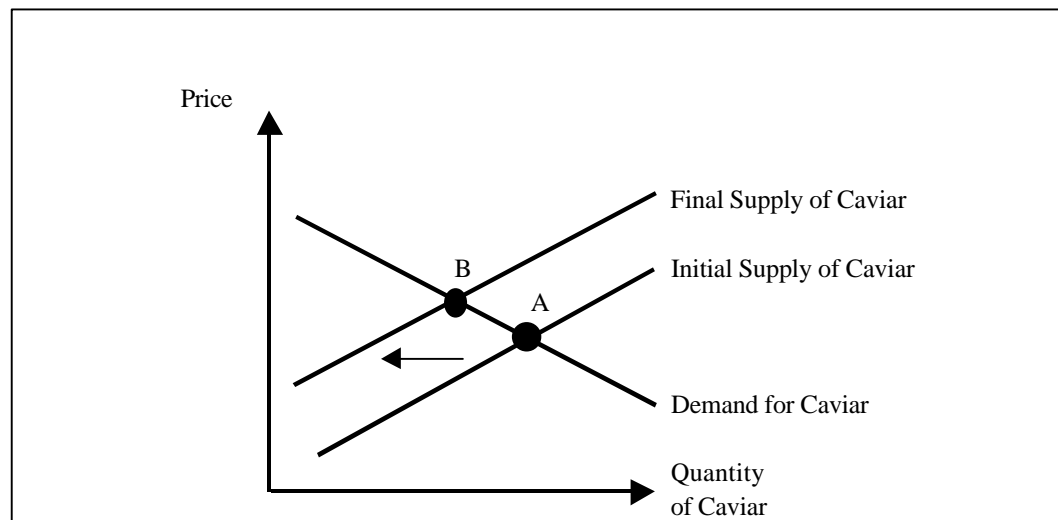
13. The net present value of the investment is

$$NPV = \frac{\$15,000}{(1 + 0.2)^1} - \$10,000 = \$12,500 - \$10,000 = \$2,500.$$

Since the net present value is positive, the investment should be undertaken. Cash flow considerations are irrelevant, in this case. Your firm could secure a \$10,000 one-year loan from the bank at 20 percent. Since the net present value is positive, in one year the \$15,000 generated from the investment will be more than enough to pay back the interest and principal on the loan. Thus, cash flow is not really an issue in this case, and in present value terms, your firm will pocket \$2,500 from this investment.

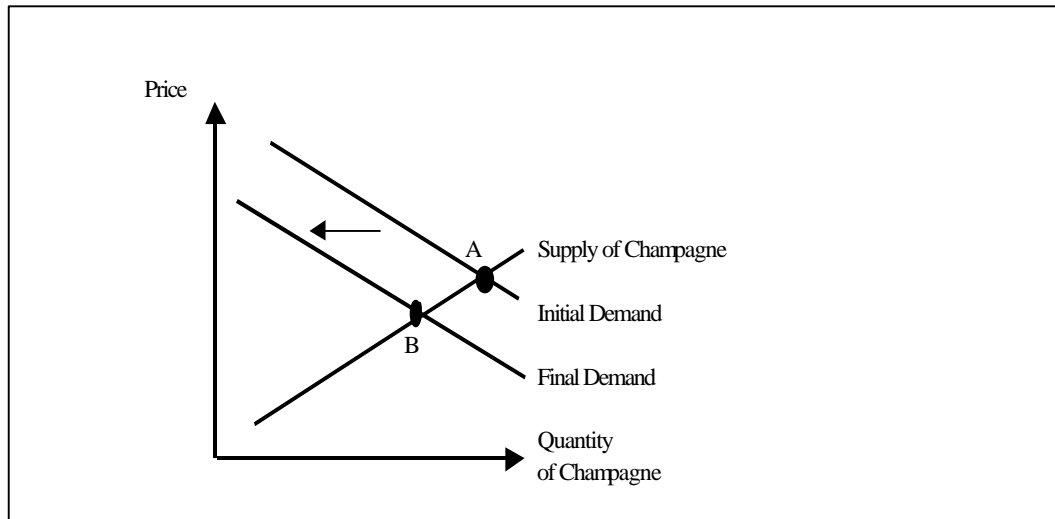
## CHAPTER 2

- 2.



**Figure 2-2(a)**

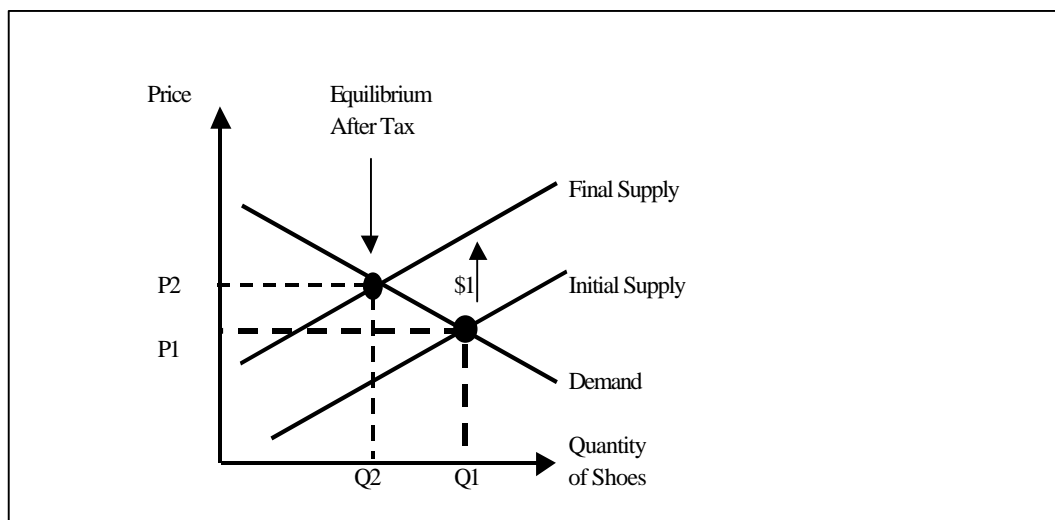
The pollution problem shifts the supply of caviar to the left and results in an increase in the equilibrium price and a decrease in the quantity of caviar sold. This is shown as the movement from A to B in Figure 2-2(a).



**Figure 2-2(b)**

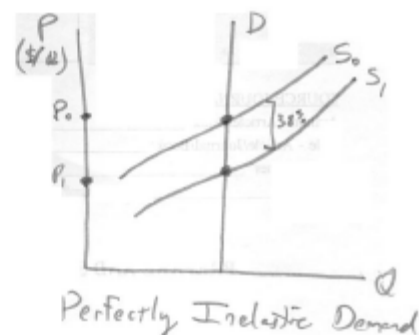
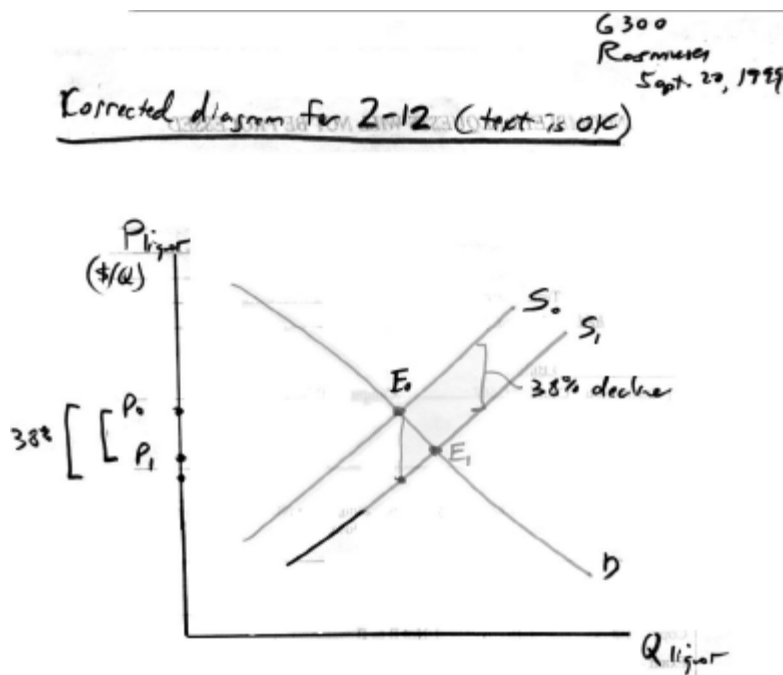
An increase in the price of caviar decreases the demand for champagne since they are complements. This results in a reduction in both the equilibrium price and quantity of champagne sold as shown by the movement from A to B in Figure 2-2(b).

7. Suppose shoe producers are responsible for paying the tax to the government. Then the \$1 tax shifts the market supply curve upward by \$1 for each quantity of shoes. This results in an increase in price from  $P_1$  to  $P_2$  and a decrease in quantity from  $Q_1$  to  $Q_2$  in Figure 2-7. Notice that the price goes up by less than the \$1 tax.



**Figure 2-7**

8. Beans and rice are probably inferior goods. If so, a reduction in income shifts demand for these goods to the right. Consequently, the ultimate impact of the recession will be to raise the price of goods sold by RB, Inc. and more beans and rice will be sold than before.
9. (a) The cost of producing pens will be reduced for each quantity of output, which will lead to an increase in the supply of pens.
- (b) Price will be reduced while quantity exchanged will increase.
- (c) A reduction in the price of pens reduces the demand for pencils. The price and quantity sold in the market for pencils will both decrease.



12. A tariff reduction can be viewed as a reduction in a tax on suppliers, which shifts the supply curve for the affected product to the right. If tariffs decline by an average of 38 percent, one would expect prices to fall due to the increase in supply the tax reduction brings forth. However, only if demand is perfectly inelastic will the entire tax (tariff) reduction be passed on to consumers in the form of a 38 percent price decline.

15. Destruction of 50% of this year's coffee bean crop means a decrease in the supply curve of coffee. The equilibrium price and quantity in the market for coffee is higher and lower, respectively. As the price of a coffee increases, the demand curve for its complement, donuts, decreases. Hence, quantities sold in the donut market will be lowered. You should order less flour. Also, you should hire fewer employees since prices and quantity sold are expected to be lower.

### CHAPTER 3.

5. By definition,

$$E_{Q,P} = \frac{\% \Delta Q}{\% \Delta P}.$$

Substitute  $E_{Q,P} = -3.5$  and  $\% \Delta P = 10$  into the equation to get  $\% \Delta Q = -35$ .

7. Dairy products are expected to have the most inelastic demand because it is the most broadly defined group, followed by cheese and then swiss cheese. A more specifically defined category has more substitutes and, therefore, more elastic demand.
8. (a) Since the own price elasticity is  $-0.68$ , we use the elasticity formula to write

$$\frac{\% \Delta Q}{-5} = -0.68.$$

Solving for  $\% \Delta Q$ , we see that there will be a 3.4 percent increase in the quantity demanded of cereal.

- (b) There will be a 5.2 percent reduction in the demand for cereal.
- (c) There will be a 15 percent reduction in the demand for cereal.
20. (a) Using the estimated own price elasticity of  $-1.5$ , the 9 percent increase in price is expected to reduce quantity demanded by 13.5 percent.
- (b) The lower bound for the 95 percent confidence interval for the elasticity is  $-1.5 - 2(.3) = -2.1$ . Based on this lower bound, the 9 percent increase in price would reduce quantity demanded by 18.9 percent. The upper bound for the 95 percent confidence interval for the elasticity is  $-1.5 + 2(.3) = -0.9$ . Based on this upper bound, the 9 percent increase in price would reduce quantity demanded by 8.1 percent. In summary the manager can be

95 percent confident that the 9 percent price increase will reduce quantity demanded somewhere between 8.1 and 18.9 percent.