

1. Jake likes parties and he likes to drink beer. He knows that if he drinks too much beer he will not feel well the next day and won't be able to get any work done. When Jake is at home, soberly considering the day-after effects of drinking, his preferences for drinking x glasses of beer at a party are represented by the utility function $U_0(x) = 10x - x^2$. Jake is invited to a party, and he knows that there will be free beer. His alternative is to spend a quiet evening with a friend at a local coffee shop discussing microeconomics and listening to cool jazz. The friend will buy the coffee. Spending such an evening would yield Jake utility of 20.
 - a. If Jake goes to the party and drinks the amount of beer that maximizes $U_0(x)$, how many glasses will he drink? _____. What will his utility be? _____.
 - b. Jake has noticed that beer has a strange effect on him. It changes his utility function. When he drinks more beer, he seems to get thirstier and to forget about the morning-after costs. In fact, for any number of beers, t , after he has drunk t beers, his utility function for drinking a *total of* x beers becomes $U_t(x) = (10 + t)x - x^2$. For example, after he has drunk 5 beers, his utility for drinking a total of x beers would be $15x - x^2$. How many beers must he drink so that his marginal utility of drinking more beer will be zero? _____. (Why is $MU = 0$ the relevant decision criteria in this case?)
 - c. Suppose that before going to the party, Jake knows that the number of beers he would drink is not the number that his sober self tells him is optimal, but that he would drink until his beer-altered preferences tell him to quit. Using his sober preferences, what utility does he expect to get if he goes to the party? _____. Would he have been better off discussing microeconomics and listening to cool jazz?

2. At the beginning of a school year a teacher whose annual salary will be \$54,000 must choose one of two options for taking her salary: 12 monthly paychecks from September to the following August, each in the amount of \$4,500; or 9 monthly paychecks from September through May, each in the amount of \$6,000. If she chooses the 12-paycheck option, what does this imply about her personal rate of discount for this decision?

3. Behavioral Economics concepts:
 - a. Suppose that two sales representatives are trying to sell insulation for peoples' homes. Sales rep. A tells people "You will save big money by replacing the insulation in your home." Sales rep. B tells people "You are losing money by not replacing the insulation in your home." If Sales rep B sells more insulation (and the sales reps are identical in all other respects), we might attribute sales rep B's higher sales to what behavioral economics concept?

 - b. Suppose that studies indicate that "most people", if given a choice between \$50 today and \$100 a year from today, would choose the \$50 today, but that, if given a choice between \$50 nine years from today and \$100 ten years from today, would choose the \$100 ten years from today. This is an example of _____ discounting.

 - c. Two identical restaurants have identical menus and identical wine lists, except that restaurant A lists its menu items and wines from most expensive to least expensive, while restaurant B lists its menu items and wines from least expensive to most expensive. If restaurant A has higher revenue per customer than restaurant B, we might attribute this to what behavior economics concept?

 - d. Trevor has decided on a savings plan that he believes is optimal for him. He will save \$5,000 this year and \$8,000 next year. When next year arrives, however, he decides to save only \$5,000. What is the term used to describe this sort of behavior?

 - e. In an informal survey, students offered a bet on the toss of a fair coin in which they stood to lose \$1 if the coin turned up tails, required a payoff of \$1.63 if the coin turned up heads. This implies that the utility associated with gaining \$1.63 was equal to the disutility of losing \$1, and is an example of _____.

4. Suppose that a honey farm is located next to an apple orchard and each acts as a competitive firm. Let the amount of apples produced be measured by A and amount of honey produced be measured by H . The cost functions of the two firms are $c_H(H) = H^2 / 100$ and $c_A(A) = (A^2 / 100) - H$. The price of honey is \$2 and the price of apples is \$3.
- a. If the firms each operate independently, the equilibrium amount of honey produced will be _____ and the equilibrium amount of apples will be _____.
- b. Suppose that the honey and apple firms merge. What would be the profit-maximizing output of honey for the merged firm? _____ What would be the profit-maximizing amount of apples for the merged firm? _____
- c. What is the socially efficient output of honey? _____ If the firms stayed separate, how much would honey production have to be subsidized to induce an efficient supply? _____

5. A clothing store and a jewelry store are located side by side in a small shopping mall. The number of customers who come to the shopping mall intending to shop at either store depends on the amount of money that each store spends on advertising per day. Each store also attracts some customers who come to shop at the neighboring store. If the clothing store spends $\$x_C$ per day on advertising, and the jeweler spends $\$x_J$ per day on advertising, then the total profits per day of the clothing store are $\Pi_C(x_C, x_J) = (60 + x_J)x_C - 2x_C^2$, and the total profits of the jewelry store are $\Pi_J(x_C, x_J) = (105 + x_C)x_J - 2x_J^2$.
- If each store believes that the other store's amount of advertising is independent of its own advertising expenditure, what is the equilibrium amount of advertising for each store and what are the profits for each store?
 - Suppose that both stores have the same profit functions as in part (a), but are owned by a single firm that chooses the amounts of advertising so as to maximize the sum of the two store profits. Under these conditions, what is the equilibrium amount of advertising for each store and what are the total profits for the owner of the two stores?

6. Firm A produces good x , while firm B produces good y , and each firm acts as a competitive firm. The cost functions of the two firms are $c_A(x) = 100 + 2x + 0.05x^2$ and $c_B(y) = 200 + .01y^2 + 2x$. The price of good x is 10 and the price of good y is 5.
- If the firms each operate independently, then in equilibrium firm A will produce _____ units of good x , and firm B will produce _____ units of good y .
 - If the two firms merge, the merged firm will produce _____ units of good x and _____ units of good y .
 - If the firms stayed separate and the government wanted to induce the firm producing the externality to produce the socially efficient output of its good, then it should impose a tax of _____ per unit on good _____.
 - The tax employed in part (c) is known as a _____ tax. What is the main problem with implementation of this kind of tax?

7. A small private airport is located next to a large tract of land owned by a housing developer. The developer would like to build houses on this land, but noise from the airport reduces the value of the land (and the houses he would like to build on it). The more planes that fly, the lower is the amount of profits that the developer makes. Let X be the number of planes that fly per day and let Y be the number of houses that the developer builds. Let the airport's profits be $\Pi_A = 48X - X^2$ (Read “ \sim ” as “minus”), and let the developer's profits be $\Pi_H = 60Y - Y^2 - XY$. Now consider the outcomes under various institutional rules about property rights and bargaining between the owner of the airport and the developer:
- Free to Choose with No Bargaining.* Suppose that no bargains can be struck between the airport and the developer and that each can decide on its own level of activity. What is the number of planes per day that maximizes profits for the airport? _____ Given that the airport will land this number of planes, what is the number of houses that maximize the developer's profits? _____ What are the profits for the airport? _____ What are the profits for the developer? _____
 - Strict Prohibition.* Suppose that a local ordinance makes it illegal to land planes at the airport. How many houses will the developer build? _____. What are the profits for the developer? _____. Compare this outcome to part (a).
 - Lawyer's Paradise.* Suppose that a law is passed that makes the airport liable for all damages to the developer's property values. To maximize his net profits, the developer will choose to build how many houses? _____ To maximize its profits, net of damages paid to the developer, the airport will choose to land how many planes? _____ What are the profits for the airport? _____ What are the profits for the developer? _____ Compare this outcome to parts (a) and (b).
 - Merger.* Suppose that the housing developer purchases the airport. What is the profit function for the new joint entity? _____. Calculate the profit maximizing number of houses, planes, and total profits under this arrangement.
 - Dealing.* Suppose that the airport and the developer remain independent. If the original situation was one of “free to choose”, could the developer increase his net profits by paying the airport to cut back one flight per day if the developer has to pay for all of the airport's lost profits? _____ Suppose the developer, realizing this, decides to get the airport to reduce its flights by paying for all lost profits coming from the reduction of flights. To maximize his own net profits, how many flights per day should he pay the airport to eliminate? _____

8. Imagine a market in which there are both high quality and low quality goods, with the demand and supply for each type of good described by the following equations (where subscripts h and l refer to high and low quality respectively):

$$\begin{array}{ll} Q_{dH} = 160,000 - 12.5P_H & Q_{dL} = 110,000 - 12.5P_L \\ Q_{sH} = 48,000 + 13.5P_H & Q_{sL} = 20,000 + 10P_L \end{array}$$

- a. Determine the price and quantity outcomes under conditions of perfect information, i.e., assume that both buyers and sellers are able to distinguish between the high and low quality goods. There will be

_____ quantity of high quality goods available at a price of _____, and there will be _____ quantity of low quality goods available at a price of _____.

- b. If buyers have no way of determining whether a given unit of the good is of high or low quality, what will eventually happen in this market? What is the name of this problem?
- c. Suppose the sellers of high quality goods decide to offer warranties on their goods as a way of differentiating their high quality goods from the low quality goods in this market. What conditions are necessary for the warranties to be a credible signal of quality, and thus generate a separating equilibrium in the market?

9. The owner of a business firm knows that her firm's total revenues are a function of how hard a hired manager works (the owner's only expense) and luck, and that the following table summarizes all possible outcomes:

	Bad Luck	Good Luck
Manager exerts minimum effort ($x = 0$)	\$100,000	\$200,000
Manager exerts maximum effort ($x = 1$)	\$200,000	\$400,000

The owner considers either bad or good luck as equally probable. The manager's cost of effort, x , is equal to $C(x) = 20,000x$, where $x = 0$ for minimum effort and $x = 1$ for maximum effort. (Thus, the manager's utility is given by $w - C(x)$, where w is the salary or wage payment. Will a "base plus bonus" plan in which the manager receives a base salary of \$20,000 plus 10% of revenue in excess of \$100,000 induce maximum effort from the manager? Use appropriate computations to explain your answer.

10. Consider a town that has equal numbers of two types of residents. Type 1 residents are careful people who conduct their daily affairs with reasonable caution. In contrast, type 2 residents are careless people who often behave like “absent-minded professors.” All of the residents own identical houses that are currently worth \$200,000, and all of them have a utility function of the following type:

$$U(\$0) = 0 \quad U(\$50,000) = 4.5 \quad U(\$75,000) = 6.5 \quad U(\$100,000) = 10 \quad U(\$200,000) = 15$$

All houses face the risk of fire. If a fire occurs, the resulting damage will be classified as either a total loss (loss = \$200,000) or a partial loss (loss = \$100,000). Type 1 residents have a 40% probability of no fire, a 20% probability of a fire that results in a partial loss, and a 40% probability of a total loss. Type 2 residents have a 10% probability of no fire, a 30% probability of a partial loss, and a 60% probability of a total loss.

- a. If all residents want to buy insurance, and if an insurance company cannot distinguish Type 1s from Types 2s, at what price would an insurance company be willing to sell it to them? (At what price would the premium equal the expected loss? We call this price the “fair premium”.)
- b. Use the fair premium that you calculated in Part (a) to show that it is utility maximizing for one type of resident to purchase insurance and not utility maximizing for the other type to purchase insurance. Clearly identify which type of resident will purchase insurance.
- c. What is the term used to describe the problem face by the insurance company in this question?
- d. If type 1 residents bought insurance and then started acting like type 2 residents, what is the term used to describe the problem that is then facing the insurance company?