The economics of information and incentives is a relatively new branch of microeconomics, in which much intriguing work is going on. This chapter shows you a sample of these problems and the way that economists think about them.

37.1 (0) There are two types of electric pencil-sharpener producers. "High-quality" manufacturers produce very good sharpeners that consumers value at \$14. "Low-quality" manufacturers produce less good ones that are valued at \$8. At the time of purchase, customers cannot distinguish between a high-quality product and a low-quality product; nor can they identify the manufacturer. However, they can determine the quality of the product after purchase. The consumers are risk neutral; if they have probability q of getting a high-quality product and $1 - q$ of getting a low-quality product, then they value this prospect at $14q + 8(1 - q)$. Each type of manufacturer can manufacture the product at a constant unit cost of \$11.50. All manufacturers behave competitively.

(a) Suppose that the sale of low-quality electric pencil-sharpeners is illegal, so that the only items allowed to appear on the market are of high quality. What will be the equilibrium price?_____.

(b) Suppose that there were no high-quality sellers. How many low-quality sharpeners would you expect to be sold in equilibrium?_____

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_____.

(c) Could there be an equilibrium in which equal (positive) quantities of the two types of pencil sharpeners appear in the market?_____

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_____.

(d) Now we change our assumptions about the technology. Suppose that each producer can *choose* to manufacture either a high-quality or a low-quality pencil-sharpener, with a unit cost of \$11.50 for the former and \$11 for the latter, what would we expect to happen in equilibrium?_____

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(e) Assuming that each producer is able to make the production choice described in the last question, what good would it do if the government banned production of low-quality electric pencil-sharpeners?_____

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37.2 (0) In West Bend, Indiana, there are exactly two kinds of workers. One kind has a (constant) marginal product worth $10 and the other kind has a (constant) marginal product worth $15. There are equal numbers of workers of each kind. A firm cannot directly tell the difference between the two kinds of workers. Even after it has hired them, it won't be able to monitor their work closely enough to determine which workers are of which type.

(a) If the labor market is competitive, workers will be paid the average value of their marginal product. This amount is_____.

(b) Suppose that the local community college offers a microeconomics course in night school, taught by Professor M. De Sade. The high-productivity workers think that taking this course is just as bad as a $3 wage cut, and the low-productivity workers think it is just as bad as a $6 wage cut. The firm can observe whether or not an individual takes the microeconomics course. Suppose that the high-productivity workers all choose to take the microeconomics course and the low-productivity workers all choose not to. The competitive wage for people who take the microeconomics course will be _____ and the wage for people who don't take the microeconomics course will be_____.

(c) If there is a separating equilibrium, with high-productivity workers taking the course and low-productivity workers not taking it, then the net benefits from taking the microeconomics course will be _____ for the high-productivity workers and _____ for the low-productivity workers. Therefore there (will be, won't be)_____ a separating equilibrium of this type.

(d) Suppose that Professor De Sade is called off to Washington, to lecture wayward representaatives on the economics of family values. His replacement is Professor Morton Kremepuff. Kremepuff prides himself on his ability to make economics "as easy as political science and as fun as the soaps on TV." Professor Kremepuff's claims are exaggerated, but at least students like him better than De Sade. High-productivity workers think that taking Kremepuff's course is as bad as a $1 wage cut, and low-productivity workers think that taking Kremepuff's course is as bad as a $4 wage cut. If the high-productivity workers all choose to take the microeconomics course and the low-productivity workers all choose not to, the competitive wage for people who take the microeconomics course will be _____ and the wage for people who don't take the microeconomics course will be_____.

(e) If there is a separating equilibrium with high-productivity workers taking the course and low-productivity workers not taking it, then the net benefits from taking Kremepuff's microeconomics course will be _____ for the high-productivity workers and _____ for the low-productivity workers. Therefore there (will be, won't be)_____ a separating equilibrium of this type.

37.3 (1) In Enigma, Ohio, there are two kinds of workers, Klutzes whose labor is worth $1,000 per month and Kandos, whose labor is worth $2,500 per month. Enigma has exactly twice as many Klutzes as Kandos. Klutzes look just like Kandos and are accomplished liars. If you ask, they will claim to be Kandos. Kandos always tell the truth. Monitoring individual work accomplishments is too expensive to be worthwhile. In the old days, there was no way to distinguish the two types of labor, so everyone was paid the same wage. If labor markets were competitive, what was this wage?_____.

(a) A professor who loves to talk offered to give a free monthly lecture on macroeconomics and personal hygiene to the employees of one small firm. These lectures had no effect on productivity, but both Klutzes and Kandos found them to be excruciatingly dull. To a Klutz, each hour's lecture was as bad as losing $100. To a Kando, each hour's lecture was as bad as losing $50. Suppose that the firm gave each of its employees a pay raise of $55 a month but insisted that he attend the professor's lectures. What would happen to the firm's labor force?_____ _____ What would happen to the average productivity of the firm's employees?_____

_____.

(b) Other firms noticed that those who had listened to the professor's lectures were more productive than those who had not. So they tried to bid them away from their original employer. Since all those who agreed to listen to the original lecture series were Kandos, their wage was bid up to_____.

(c) After observing the "effect of his lectures on labor productivity," the professor decided to expand his efforts. He found a huge auditorium where he could lecture to all the laborers in Enigma who would listen to him. If employers believed that listening to the professor's lectures improved productivity by the improvement in productivity in the first small firm and offered bonuses for attending the lectures accordingly, who would attend the lectures?_____ Having observed this outcome, how much of a wage premium would firms pay for those who had attended the professor's lectures?_____.

(d) The professor was disappointed by the results of his big lecture and decided that if he gave more lectures per month, his pupils might "learn more." So he decided to give a course of lectures for 20 hours a month. Would there now be an equilibrium in which the Kandos all took his course and none of the Klutzes took it and where those who took the course were paid according to their true productivity?_____

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(e) What is the smallest number of hours the professor could lecture and still maintain a separating equilibrium?_____.

37.4 (1) Old MacDonald produces hay. He has a single employee, Jack. If Jack works for x hours he can produce x bales of hay. Each bale of hay sells for \$1. The cost to Jack of working x hours is $c(x) = x^2/10$.

(a) What is the efficient number of bales of hay for Jack to cut?_____.

(b) If the most that Jack could earn elsewhere is zero, how much would MacDonald have to pay him to get him to work the efficient amount?

_____.

(c) What is MacDonald's net profit?_____.

(d) Suppose that Jack would receive $1 for passing out leaflets, an activity that involves no effort whatsoever. How much would he have to receive from MacDonald for producing the efficient number of bales of hay?_____.

(e) Suppose now that the opportunity for passing out leaflets is no longer available, but that MacDonald decides to rent his hayfield out to Jack for a flat fee. How much would he rent it for?_____.

37.5 (0) In Rustbucket, Michigan, there are 200 people who want to sell their used cars. Everybody knows that 100 of these cars are "lemons" and 100 of these cars are "good." The problem is that nobody except the original owners know which are which. Owners of lemons will be happy to get rid of their cars for any price greater than $200. Owners of good used cars will be willing to sell them for any price greater than $1,500, but will keep them if they can't get $1,500. There are a large number of buyers who would be willing to pay $2,500 for a good used car, but would pay only $300 for a lemon. When these buyers are not sure of the quality of the car they buy, they are willing to pay the expected value of the car, given the knowledge they have.

(a) If all 200 used cars in Rustbucket were for sale, how much would buyers be willing to pay for a used car?_____ Would owners of good used cars be willing to sell their used cars at this price?_____ Would there be an equilibrium in which all used cars are sold?_____ Describe the equilibrium that would take place in Rustbucket._____

_____.

(b) Suppose that instead of there being 100 cars of each kind, everyone in town is aware that there are 120 good cars and 80 lemons. How much would buyers be willing to pay for a used car?_____ Would owners of good used cars be willing to sell their used cars at this price?_____ Would there be an equilibrium in which all used cars are sold?_____

Would there be an equilibrium in which only the lemons were sold? _____ Describe the possible equilibrium or equilibria that would take place in Rustbucket._____

_____.

37.6 (1) Each year, 1,000 citizens of New Crankshaft, Pennsylvania, sell their used cars and buy new cars. The original owners of the old cars have no place to keep second cars and must sell them. These used cars vary a great deal in quality. Their original owners know exactly what is good and what is bad about their cars, but potential buyers can't tell them apart by looking at them. Lamentably, though they are in other respects model citizens, the used-car owners in New Crankshaft have no scruples about lying about their old jalopies. Each car has a value, V, which a buyer who knew all about its qualities would be willing to pay. There is a very large number of potential buyers, any one of which would be willing to pay \$$V$ for a car of value \$$V$.

The distribution of values of used cars on the market is quite simply described. In any year, for any V between 0 and \$2,000, the number of used cars available for sale that are worth less than \$$V$ is $V/2$. Potential used-car buyers are all risk-neutral. That is if they don't know the value of a car for certain, they value it at its expected value, given the information they have.

Rod's Garage in New Crankshaft will test out any used car and find its true value V. Rod's Garage is known to be perfectly accurate and perfectly honest in its appraisals. The only problem is that getting an accurate appraisal costs \$200. People with terrible cars are not going to want to pay \$200 to have Rod tell the world how bad their cars are. But people with very good cars will be willing to pay Rod the \$200 to get their cars appraised, so they can sell them for their true values.

Let's try to figure our exactly how the equilibrium works, which cars get appraised, and what the unappraised cars sell for.

(a) If nobody had their car appraised, what would the market price for used cars in North Crankshaft be and what would be the total revenue received by used-car owners for their cars?_____

_____.

(b) If all the cars that are worth more than \$$X$ are appraised and all the cars that are worth less than \$$X$ are sold without appraisal, what will the market price of unappraised used cars be? (Hint: What is the expected value of a random draw from the set of cars worth less than \$$X$?)_____.

(c) If all the cars that are worth more than $\$X$ are appraised and all the cars that are worth less than $\$X$ are sold without appraisal, then if your car is worth $\$X$, how much money would you have left if you had it appraised and then sold it for its true value?_____ How much money would you get if you sold it without having it appraised?

_____.

(d) In equilibrium, there will be a car of marginal quality such that all cars better than this car will be appraised and all cars worse than this car will be sold without being appraised. The owner of this car will be just indifferent between selling his car unappraised and having it appraised. What will be the value of this marginal car?_____

_____.

(e) In equilibrium, how many cars will be sold unappraised and what will they sell for?_____

_____.

(f) In equilibrium, what will be the total net revenue of all owners of used cars, after Rod's Garage has been paid for its appraisals?_____

_____.

37.7 (2) In Pot Hole, Georgia, 1,000 people want to sell their used cars. These cars vary in quality. Original owners know exactly what their cars are worth. All used cars look the same to potential buyers until they have bought them; then they find out the truth. For any number X between 0 and 2,000, the number of cars of quality lower than X is $X/2$. If a car is of quality X, its original owner will be willing to sell it for any price greater than X. If a buyer knew that a car was of quality X, she would be willing to pay $X + 500$ for it. When buyers are not sure of the quality of a car, they are willing to pay its expected value, given their knowledge of the distribution of qualities on the market.

(a) Suppose that everybody knows that all the used cars in Pot Hole are for sale. What would used cars sell for? _____ Would every used car owner be willing to sell at this price? _____ Which used cars would appear on the market?_____.

(b) Let X^* be some number between 0 and 2,000 and suppose that all cars of quality lower than X^* are sold, but original owners keep all cars of quality higher than X^*. What would buyers be willing to pay for a used car? _____ At this price, which used cars would be for sale? _____.

(c) Write an equation for the equilibrium value of X^*, at which the price that buyers are willing to pay is exactly enough to induce all cars of quality less than X^* into the market. _____ Solve this equation for the equilibrium value of X^*._____.