

**DIRECTIONS:**

- Write your name and student ID number on the first page of each packet. If for any reason you separate the pages, make sure your name AND your student ID number are on each page.
- The exam is out of 100 points. Carefully read each question and budget your time appropriately.
- There are **THREE (3)** packets to the exam.
  - In part A, you should answer **seven** of the **eight** questions. Only the first seven responses will be graded. If you change your mind about which question to answer, make sure it is clear which seven answers you want graded
  - In part B, you must answer **three** of the **four** questions. Only the first three questions answered will be graded. If you change your mind about which question to answer, make sure it is clear which three answers you want graded.
  - In part C, you must answer all the questions in this part.
- You must answer all questions ON THE EXAM PAPER. NO credit will be given for any answers not on the exam sheet. If you need additional space, use the back of the page or the blank pages at the end of each section. However, make sure that your work for each question is in the same packet as the question.
- If you make any assumptions in answering a question, explain your assumptions.
- Explain all your diagrams and show work.
- Try to write something for every question. We cannot award partial credit for blank answers.

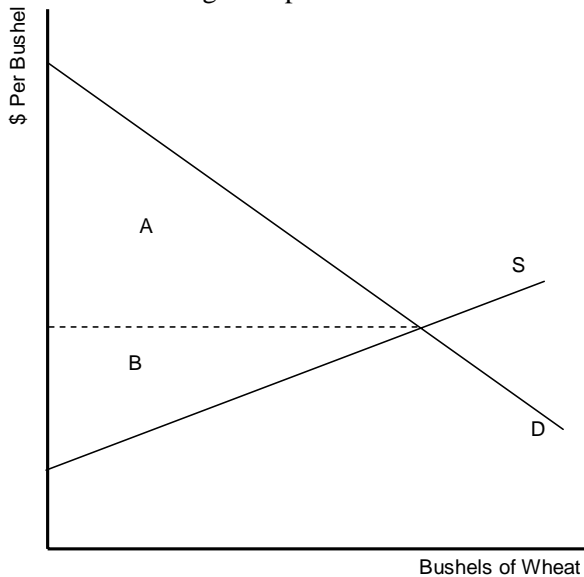
**UBFORMULAS:**

The following formulas may or may not be useful to you in answering questions on the exam.

- The share of a tax borne by a consumer is given by  $\frac{\eta}{\eta - \varepsilon}$  where  $\eta$  is the supply elasticity and  $\varepsilon$  is the demand elasticity.
- The Lerner Rule tells us that  $\frac{p - MC}{p} = -\frac{1}{\varepsilon}$
- Discounting formulas
  - $PV = \frac{FV}{(1 + i)^t}$
  - Value of a perpetuity  $PV = \frac{f}{i}$
  - Real interest rate  $i$  and nominal interest rate  $\tilde{i}$  satisfy  $i = \frac{\tilde{i} - \gamma}{1 + \gamma}$  where  $\gamma$  is the rate of inflation.
- Variance of a gamble is given by  $\sum_i p_i (y_i - EV)^2$  where outcome  $y_i$  occurs with probability  $p_i$  and EV is the expected value.

**PART A: ANSWER 7 out of 8 QUESTIONS (5 pts EACH)**

- A1. True/False/Ambiguous AND explain why. If Jen is behaving optimally, her marginal rate of substitution between CDs and books must be equal to the ratio of the prices of books and CDs.
- A2. Give three reasons why \$100 today is worth more than \$100 tomorrow
- A3. Pat's currently has a monopoly on the sale of cheese steaks and makes profits of \$500, but another firm, Geno's, is considering entering the market. Assume the fixed costs of entering are less than \$50. Pat's figures that if both firms enter, they'll each earn profits of \$150. Alternatively, Pat's can bribe the suppliers of an input, cheese, to raise their price to Geno's. With the higher price, Geno's will earn profits of \$50 and Pat's will earn profits of \$250. Draw the game tree. What is the most that Pat's would be willing to pay to bribe the cheese suppliers?
- A4. Crest is a monopolistically competitive firm in the toothpaste industry. Draw a diagram illustrating Crest's output decision problem. Your diagram should illustrate Crest's profit-maximizing quantity and price and should demonstrate that the market is in a monopolistically competitive equilibrium.
- A5. The smoking of cigarettes causes a negative externality. Draw a diagram that demonstrates how welfare could be higher if cigarettes were produced by a monopoly instead of a large number of competitive firms.
- A6. Assume that wheat is produced by a large number of identical producers with no barriers to entry. The only inputs used in producing wheat are labor and land. If the supply of labor is perfectly elastic, what do areas A and B in the figure represent?

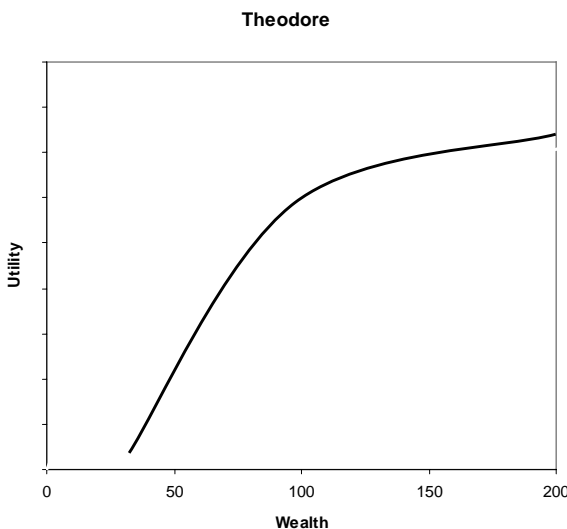
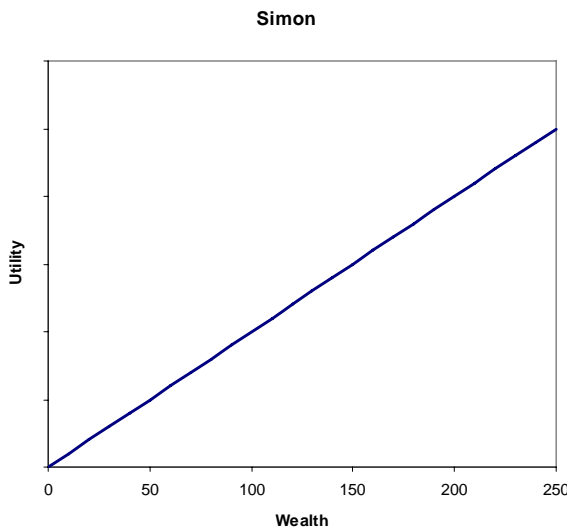
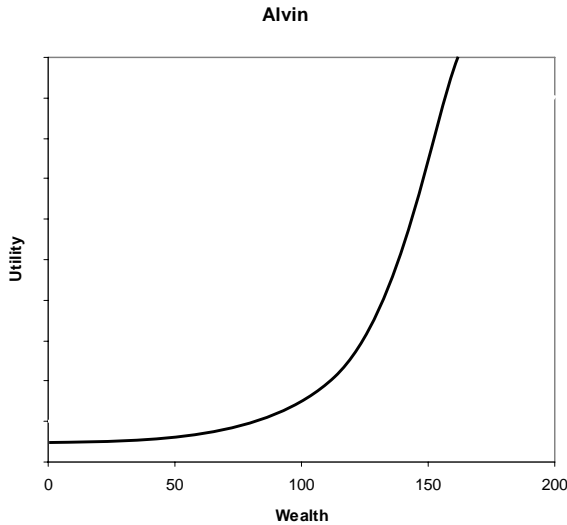


- A7. Briefly describe a disciplined approach to determining the economically optimal decision rules that a decision maker will choose when faced with choices. While you may use examples to illustrate your answer, the approach should be a general approach that is applicable for any decision problem.
- A8. Three of your fellow students are sitting in a coffee bar, engaged in an animated discussion about problems of asymmetric information. Larry argues adamantly that problems arise when sellers know something that buyers don't know, and that any other details are unimportant. Moe is insistent that it only matters whether buyers are ignorant or fully informed. Curly is trying to convince the others that there is a difference between problems where sellers know information about their product before they decide what to do and problems where one side of the market can't observe actions taken by the other side of the market. Help these stooges resolve their debate (i.e. explain who is right and why).

**PART B: ANSWER 3 OUT OF 4 QUESTIONS IN THIS SECTION (10 pts EACH)**

B1. The market for electricity is currently in a long-run competitive equilibrium. All plants are identical with standard U-shaped cost curves and there are no barriers to entry. Assume demand is downward sloping.

- a. (5 pts) Use a two-panel diagram to illustrate the equilibrium for an individual plant and for the market. Your diagrams should identify the amount of electricity produced by each plant ( $q$ ), the total electricity consumed in the market ( $Q$ ), and the market-clearing price ( $p$ ). It should also include the short ( $SRS$ ) and long-run ( $LRS$ ) industry supply curves. Finally, you should demonstrate how to determine the number of plants in the industry.



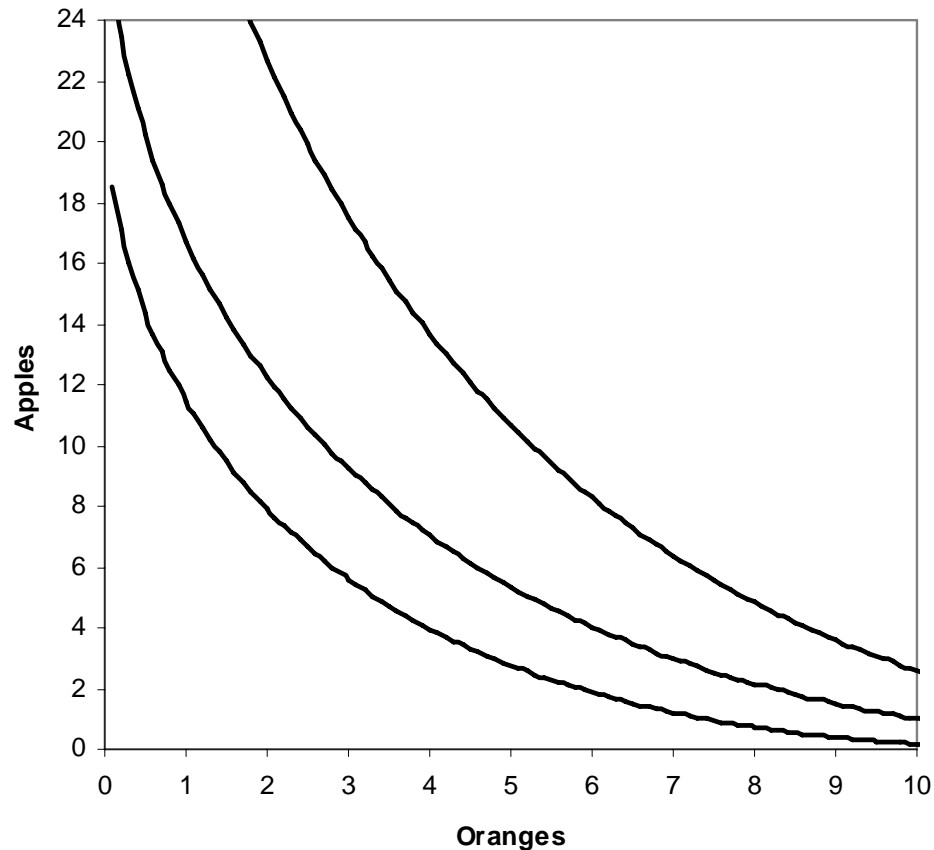
- b. (5 pts) Suppose two changes occur in the market. First, the government imposes regulations on new power plants that raise the marginal cost of producing electricity by a constant amount per unit produced. However, the existing plants are grandfathered in. (In other words, the existing plants do not have to comply with the regulations and can continue to produce electricity at the lower marginal cost). At the same time, demand shifts outward. Draw a new set of diagrams illustrating the new equilibrium quantities for individual plants of both types (new,  $q_n$ , and old,  $q_o$ ), the total market quantity ( $Q$ ) and the market-clearing price ( $p$ ). Your diagram should also identify the long-run market supply curve ( $LRS$ ). (Assume that *at least* one old plant and one new plant operate in the new equilibrium).

B2. Three brothers, Alvin, Simon, and Theodore, have utility functions over money shown in the diagrams below.

- a. (1.5 pts) What is each brother's attitude toward risk?
- b. (6 pts) Suppose each brother has a current wealth of \$100 and can spend \$50 to buy a stock. There is a 50% chance the stock will be worthless and a 50% chance its value will be \$100. For each brother, identify in the diagram the expected value, expected utility, certainty equivalent, and risk premium of buying the stock. Who will purchase the stock?
- c. (2.5 pts) The three have a friend, Dave, who knows whether the stock will be worth \$100 or not. How much would Simon be willing to pay for this information? Would it be worth more or less to Alvin? to Theodore? Explain your answer.

B3. The diagram below represents David's indifference curves between apples and oranges. Suppose he has \$20 to spend on both goods and assume the price of apples is \$1.

- (3 pts) Illustrate on the diagram how the income and substitution effects change the consumption of oranges as the price of oranges rises from \$2 to \$4.
- (3 pts) Illustrate on the diagram how the income and substitution effects change the consumption of apples due to the *same* price change (i.e. the price of oranges rising from \$2 to \$4).



- (2 pts) Sketch the demand curve for oranges. (You only need to include two points.)
- (2 pts) Explain whether you can graph the demand curve for apples with the information identified in parts a and b.

B4. Two firms compete in selling identical widgets. They choose their output levels  $Q_1$  and  $Q_2$  simultaneously and face the demand curve  $P = 30 - Q$  where  $Q$  is the total market quantity. Until recently, both firms had *zero marginal costs*. Recent environmental regulations have increased Firm 2's marginal cost to \$15.

- (5 pts) Solve for the initial equilibrium when both firms have zero marginal costs. Your answer should identify the amount produced by each firm, their profits, and the market-clearing price. You must show the steps to receive full credit (i.e., just using formulas from the book will not get full credit).
- (5 pts) True/False and explain why. As a result of the environmental regulation, the market price will rise to the *monopoly* level.

**ADDITIONAL SPACE FOR ANSWERING QUESTIONS IN PART B**

(Do NOT write any answers for parts A or C on this page. Clearly label which question you are answering.)

**PART C: ANSWER BOTH THESE QUESTIONS**

- C1. (18 pts) There are two car dealerships in Metropolis. Harry sells high-quality cars that cost Harry \$8000 each. Lew sells low quality cars that cost Lew only \$5000. Consumers are willing to pay \$10,000 for a high quality car and \$7000 for a low-quality car. Unfortunately, the dealerships are new and haven't developed a reputation yet so consumers believe there is a 50% chance that the car purchased will be low-quality regardless of which dealership it is purchased from.
- a. (5 pts) In equilibrium, what will the price of cars be and how much profit will each dealership make per car it sells?
  - b. (5 pts) How would your answer change if high-quality cars cost Harry \$9000?
  - c. (4 pts) Suppose Harry's cost for high quality cars is again \$8000. Both dealerships have the option to have their cars certified as high quality by an independent third party for a fee of  $\$x$ . (Only high quality cars will actually be certified.) For what values of  $x$  will there be a pooling equilibrium? a separating equilibrium? Explain. (Your explanation should include a description of the equilibrium in each case.)
  - d. (4 pts) What incentives exist for either Harry's or Lew's to deviate from either of the two equilibria found in part c.
- C2. (17 pts) The Hatfields like pink flamingo lawn ornaments. Their marginal benefit of flamingo ornaments is given by  $20 - 2Q$  where  $Q$  represents the number of lawn ornaments on their lawn. Their next-door neighbors, the McCoys, dislike the lawn ornaments and hence refuse to speak to their neighbors. They suffer marginal harm from each additional lawn ornament given by  $3Q$ . (For all parts of this question, full credit requires a mathematical solution. However, half credit for each part will be awarded for a correct, clearly labeled diagram).
- a. (3 pts) Given the present situation (where the McCoys have no recourse against the lawn ornaments and no discussion occurs between the neighbors), how many lawn ornaments do the Hatfields have? What is the total benefit they receive? The total cost to their neighbors?
  - b. (3 pts) What is the socially optimal number of lawn ornaments?
  - c. (3 pts) Explain to the McCoys how they can achieve the number of lawn ornaments found in part b, if they are willing to speak to their neighbors.
  - d. (3 pts) Suppose instead that the town passes an anti-lawn ornament ordinance which prohibits anyone from displaying lawn ornaments without the permission of their neighbors. If the Hatfields and McCoys are willing to negotiate, what will happen? Why?
  - e. (2 pts) In reality, the Hatfields' lawn ornaments harm not only the McCoys but the rest of the neighborhood as well. If each neighbor has the same marginal harm schedule, how would you find the socially optimal number of lawn ornaments? (You don't have to find the number; just explain how you would do so.)
  - f. (3 pts) Do you think it will be possible to reach this number through bargaining? Why or why not?

**ADDITIONAL SPACE FOR ANSWERING QUESTIONS IN PART C**

(Do NOT write any answers for parts A or B on this page. Clearly label which question you are answering.)