Multiple Choice (MC) questions have only one correct answer, which may depend on your interpretation of the question. Other kinds of questions may have more than one correct answer. If you don’t understand the meaning of a question, you may write to your own TF (on course website see Classes > Teaching Fellows), but do not expect him/her to give you answers. The problem set will not be graded, but the way you discuss the problems in your discussion section will affect your discussion-section score. Your work on the problem sets will improve your performance in the course, but only if you understand the ideas behind the answers. Good reasons for your answer are more important than what the answer is. You are allowed to work on the problem sets with other students.

1. What do you think about the following statements? Explain each of your answers.
   i. Monopolies are inefficient because they restrict production below the optimal level in order to extract rents.
   ii. We can remove all monopoly inefficiencies by allowing monopolies to perfectly price discriminate.
   iii. With perfect price discrimination we maximize social surplus and both consumers and producers are better off.

   **Game GG:** Two players, 1 and 2, have to simultaneously decide whether to play A or B (a or b). The payoffs depend on each other’s behavior. They are shown in the following table. Answer the two MC questions below and be prepared to defend your answers.

   ![Game GG Table]

   2. **[MC] See Game GG:** For Player 1, playing B is:
      a. a mixed strategy
      b. a strictly dominant strategy
      c. a dominated strategy
      d. NONE of the above

   3. **[MC] See Game GG:** How many Nash Equilibria does this game have and what are they?
      a. None
      b. One (A, a)
      c. One (B, b)
      d. Two (A, a) and (B, b)

4. Due to recent events, there is increasing tension between the free city of Karalis and the evil kingdom of Tiscali. Both Karalis and Tiscali are considering attacking the other city to solve the dispute. If Karalis attacks and Tiscali does not, Karalis gets 100 units of cork from Tiscali. If Tiscali attacks and Karalis does not, Tiscali obtains 150 units of cork from Karalis. If they both attack, they fight and 50 units of cork are destroyed for each party. If no party attacks, no cork is destroyed.
   i. Represent the situation as a normal form game. Include all details.
   ii. Find the dominant strategy for Tiscali, if any. Explain.
   iii. Find the Nash equilibrium/equilibria of the game. Explain.
   iv. Is the equilibrium/equilibria of the game Pareto efficient? Explain.

5. From the point of view of consumers, is there anything beneficial about price discrimination? Explain your answer.
6. Suppose the following graph represents a natural monopoly.

![Graph](image)

i. Suppose this natural monopoly is not permitted to price-discriminate but is otherwise unregulated. What will be the monopolist’s price for the good, its total output, and its profit? Explain carefully.

ii. Suppose in addition a regulator requires this natural monopoly to produce and sell the socially optimal amount of output if it is open for business. What price would the monopolist have to set for the good? How much output would it have to produce? Would the monopolist close down its business? Explain your answers.

iii. What price should the regulator set for this natural monopoly to stay in business?

7. The following graph shows the demand and cost curves for Bubba Lobster, the only seafood restaurant in a small town. The restaurant has a fixed cost of $1000.

![Graph](image)

In each of the following situations, state the quantity of lobsters sold and the price(s) charged by the monopolist, and calculate consumer surplus, producer surplus, and profit. Explain each of your answers.

i. The restaurant has to charge the same price to all customers.

ii. The restaurant can correctly guess each customer’s WTP from the way he or she dresses.

iii. The mayor decides to place a price ceiling on lobsters in order to force the restaurant to produce the efficient amount of lobsters.

8. Using what you learned in lecture, discuss:

i. Why do some fast food restaurants provide coupons to customers that they need to print from the website? Why don’t they simply lower the price of food on the menus?

ii. Is this an example of perfect price discrimination?
9. Rock-paper-scissors is a hand game usually played between two people, in which each player simultaneously forms one of three shapes with an outstretched hand. These shapes are "rock" (a closed fist), "paper" (a flat hand), and "scissors" (a fist with the index and middle fingers extended, forming a V). Suppose Rock beats Scissors, Scissors beats Paper, and Paper beats Rock.
   i. Represent the situation as a normal form game. Include all details.
   ii. Is there a pure-strategy equilibrium of this game? Explain.
   iii. What do you think each person should each person do? (You can guess without doing any calculation)

10. [MC] Which of the following statements about price discrimination is not true? Discuss.
   a. Price discrimination can raise economic welfare.
   b. Perfect price discrimination requires that the seller be able to separate buyers according to their WTPs.
   c. Perfect price discrimination reduces output.
   d. Price discrimination increases a monopolist's profits.

11. [MC] What is the Nash equilibrium of the following game? Explain

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<thead>
<tr>
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<th>X</th>
<th>Y</th>
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<tr>
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<tr>
<td>C</td>
<td>8, 0</td>
<td>20, 0</td>
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   a. B,Y
   b. C,Z
   c. A,X
   d. A,Y

12. Are the following statements true or false? Explain each of your answers.
   i. For a perfectly discriminating monopoly, the price is the same as the marginal cost.
   ii. For a nondiscriminating monopoly, marginal revenue is less than the price.
   iii. All types of monopolies are likely to engage in rent seeking.
   iv. All types of monopolies produce lower than the socially efficient quantity.
   v. Consumer surplus is higher and total surplus is lower in a market with a nondiscriminating monopoly than in one with a perfectly discriminating monopoly.

13. Suppose you are in charge of regulating a monopoly, and you have perfect information regarding the demand curve and the marginal revenue and marginal cost curves. Explain each of your answers.
   i. How would you determine what the socially efficient quantity and price are?
   ii. What quantity and price would the monopoly use if you don’t regulate it?
   iii. What tool could you use to regulate the monopoly (taxes, subsidies, price ceilings or price floors)?
   iv. Could your tool lead to an efficient outcome?
   v. In practice, what is a problem you might encounter in achieving your goal?