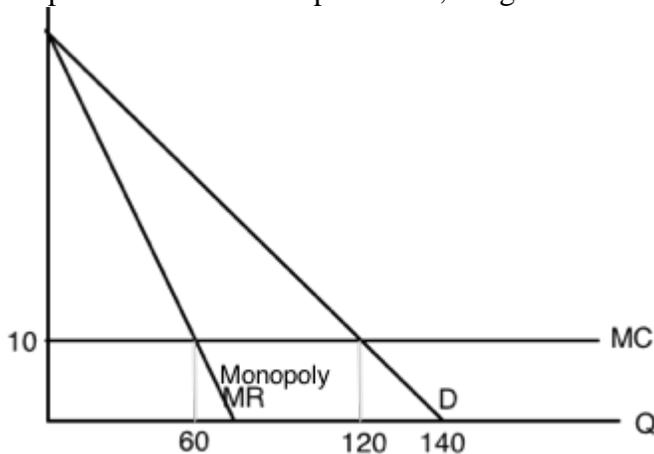


## EC101 DD/EE. Problem Set 11

Multiple Choice [MC] questions have only one correct answer. Other kinds of questions may have more than one correct answer. You should understand **why** your answers are correct. If you don't understand the meaning of a question, you may write to your own TF, but do not expect him/her to give you answers.

Discussion sections have ended, but your TFs will review these problems in the review sessions on Wednesday and Thursday, December 13-14 (see the course-website announcement). These sessions are voluntary, and your attendance and participation will **not** count towards your course grade.

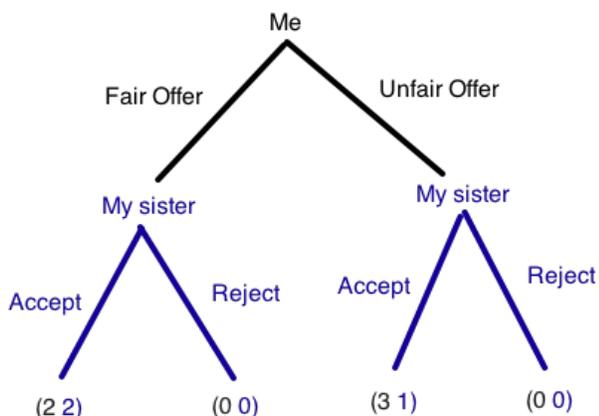
The next three questions are based on the following graph, which shows the demand curve for luxury toothpaste. There are two producers, Colgate and Sensoshine, each with constant marginal cost of \$10.



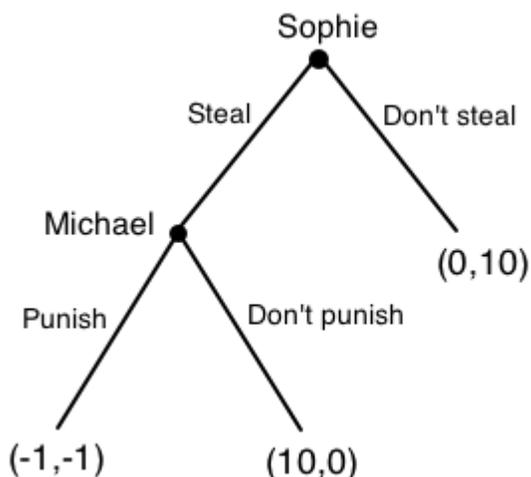
- [MC] In the Nash equilibrium of the Cournot game, each firm will produce:
  - 60 tubes of toothpaste
  - 120 tubes of toothpaste
  - 40 tubes of toothpaste
  - 30 tubes of toothpaste
- [MC] Suppose the two firms sign a contract whereby they agree to act as a monopoly and split the market equally. Then each firm will produce:
  - 60 tubes of toothpaste
  - 120 tubes of toothpaste
  - 40 tubes of toothpaste
  - 30 tubes of toothpaste
- [MC] The socially efficient level of output for this industry is:
  - 60 tubes of toothpaste
  - 120 tubes of toothpaste
  - 40 tubes of toothpaste
  - 30 tubes of toothpaste
- [MC] A monopolistic competitive market is \_\_\_\_\_.
  - efficient when all firms are making zero economic profit
  - efficient when all firms make zero normal profit
  - inefficient because firms always make zero economic profit
  - inefficient because in the long run, there are too many firms

The next two questions are based on the following game (known as the ultimatum game):

“My mother has given me \$4 to share with my sister. I’m supposed to offer my sister some of the money, and keep the rest. If my sister accepts the offer we each keep our money. If she rejects the offer, my mother gets angry and takes the money back, leaving us with nothing.” This interaction can be depicted in the following tree:



5. [MC] How many strategies does my sister have in this game?
  - a. 4
  - b. 2
  - c. 3
  - d. 1
  
6. [MC] In the subgame perfect Nash equilibrium, what strategy will my sister adopt?
  - a. Only accept my offer when it’s fair
  - b. Always accept my offer
  - c. Only accept my offer when it’s unfair
  - d. Always reject my offer
  
7. [MC] Michael’s granddaughter, Sophie, likes cookies. Sophie can decide to steal Michael’s cookies. If she steals the cookies, Michael must decide whether to punish her or not, but he really doesn’t like to punish her, because it makes her cry.



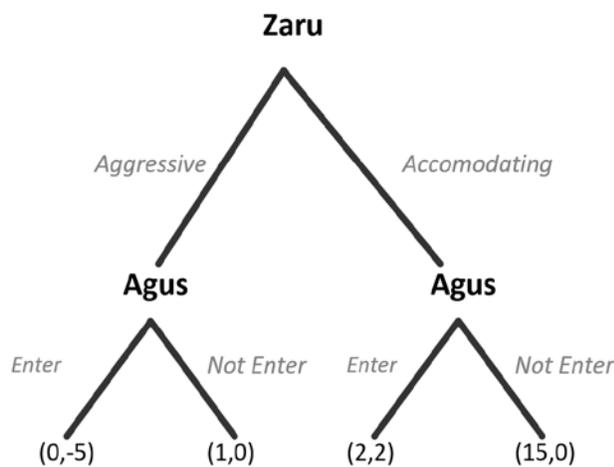
- i. What are each player’s strategies? Write the above game in normal form.
- ii. What are the Nash equilibria?
- iii. Are all the Nash equilibria also subgame perfect Nash equilibria? Explain.

8. [MC] Which of the following statements is NOT true under monopolistic competition in the long run?
- Firms operate below the efficient level of production.
  - Because of free entry, firms produce the socially efficient quantity.
  - Firms make zero profit.
  - Each firm's ATC is tangent to its demand curve at the quantity produced.
9. What is the definition of a zero sum game? Provide an example.
10. [MC] If in monopolistic competition in the short run, firms make economic profits, then in the long run, new firms will enter the market. The \_\_\_\_\_ each individual firm's product will \_\_\_\_\_. In the new long-run equilibrium firms will make \_\_\_\_\_ profit.
- demand for; increase; zero economic
  - supply of; increase; zero economic
  - demand for; decrease; zero economic
  - supply of; decrease; an economic
11. [MC] One important difference between monopoly and monopolistic competition is:
- The slope of the demand curve that the industry faces.
  - The fact that there are no barriers to entry in monopolistic competition.
  - The greater restriction of output in monopolistic competition.
  - The fact that marginal revenue and the demand curve are the same for a monopoly.
12. There are two firms (A and B) considering whether or not to enter a new market. The market is only big enough to support one of the two firms. If both firms enter the market then they will both make a loss of \$10 million. If only one firm enters the market, that firm will earn a profit of \$50 million, and the other firm will just break even (earn zero). We assume that firm B observes whether firm A has entered the market before it decides what to do.
- Write the extensive form of this game. What are the strategies for firm A? What about firm B. What is the normal form of this game?
  - Are the following two strategies time-consistent? Explain.
    - Firm B threatens to always enter the market irrespective of what firm A does.
    - Firm B promises to always do the opposite of what firm A does.
13. In a market there are thousands of firms producing women's sweaters, with slightly differentiated sweaters.
- What type of market structure do you expect to exist here?
  - How will individual firms decide how much to produce and the price to sell at in the short run?
  - Suppose firms are making a loss. What do you expect to occur in this market, and how would it affect the negative profit of existing firms?
  - Would more firms have an incentive to enter at this point?
14. Which of the following is true? Explain.
- In the long-run equilibrium of monopolistic competition, firms produce at the minimum of average total cost.
  - In the equilibrium of a Bertrand game, firms produce the socially optimal quantity.
  - A market with thousands of firms is one in which each firm considers the strategies other firms when deciding its own strategy.

15. All firms in this market have a constant marginal cost of \$4 for every unit and face no fixed costs. The market demand for the product is shown in the table on the right. In the following situations, what will be the price, quantity supplied, and profits of the firms? Also, what will be the total quantity supplied and the consumer surplus?
- Duopoly in a Bertrand game
  - Duopoly in a Cournot game
  - Oligopoly with 4 firms in a Cournot game
  - Oligopoly with 9 firms in a Cournot game

Price	Quantity demanded
24	0
20	12
16	24
12	36
8	48
6	54
4	60
0	72

16. The evil Zaru is the only producer of olive oil in the free city of Karalis. Agus sees he's making good profits out of it, and she considers to enter the market too. Zaru has to decide his prices in advance, and he can be aggressive, putting low prices to have Agus making negative profits, or accommodating towards Agus. The payoff are represented in the following diagram.



- Represent the game in normal form.
  - Find the Nash Equilibria of the game in normal form.
  - Do you think the Nash Equilibria you have found are reasonable? Why/why not?
  - Find the Subgame Perfect Equilibrium
17. [From Practice exam] A small town has two bars in which residents can drink beer. Each bar owner must decide whether to set a high price or a low price for beer without knowing what the other bar owner has done. The payoff table, showing profit per week, is provided below. The profit in each cell is shown as (Bar 1, Bar 2).

		Bar 2	
		Low Price	High Price
Bar 1	Low Price	(0, 400)	(300, 300)
	High Price	(100, 100)	(400, 0)

- Do Bar 1 and Bar 2 have strictly dominant strategies? If so, what are they?
- What are the equilibria of this game?
- Which of the games described in lecture is most similar to this game (Battle of the Sexes, Matching Pennies, Prisoners Dilemma)? Why?