ECON 360: Intermediate Microeconomics

Homework 2

- Define any variables you need to answer the problems.
- Use any materials to help you with these questions. That includes others in this course!
- Please write your answers in the space provided.
- Keep your answers short but clear. Your goal is to convince a skeptical grader that you understand the relevant concepts well enough to answer the question you are given.
- The questions on this homework sum to 67 points. But you get a 100 for completing/attempting the majority of the questions.
- Remember to write down the names of anyone you worked with on this homework!
- Bring any and all questions to office hours!

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1. (4 points) What is your name?
2. (4 points) Who did you work with on this homework?

1 True/False Questions

Indicate "T"rue or "F"alse for each of the following statements or claims. For each false statement, if you explain why it is false I will give you a bonus point.

3. (2 points) Bill has 2 tests on Friday, and today is Monday. One test is in economics, and the other is in cultural anthropology. Bill writes out his study plan for the week leading up to both exams that contains the number of hours on each day he will study for each subject. **Claim**: If Bill optimized based on the definition of optimization we have learned in class, allocating an additional hour to studying either subject should increase Bill's utility by the same amount.

4. (2 points) Tommy and Bonnie are first-graders trading lunch items in the cafeteria. Both Tommy and Bonnie have 2 fruit cups and 10 skittles. The marginal utility for fruit cups and skittles is positve for both Tommy and Bonnie. **Claim**: If both Bonnie and Tommy behave rationally, one possible allocation after trade is for Tommy to have 3 fruit cups and 12 skittles.

5. (2 points) Suppose Cassie has a paper due on Friday for her history class worth %15 of her grade, and a math test on Thursday worth %10 of her grade. Currently she has the same average in both classes and cares equally about her grade in both classes. She chooses to work on her history paper instead of study for her math test. The next week, Cassie again has a paper due on Friday for her history class worth %15 of her

grade and a math test on Thursday worth %10 of her grade. Her average in history is now higher in her history class than her math class. She chooses to study for her math test. **Claim**: Based on what we have learned in class, Cassie is not exhibiting rational behavior.

6. (2 points) Suppose there are only three goods x_1, x_2, x_3 with associated prices p_1, p_2, p_3. **Claim**: If at any prices and any income level m, the consumer spends all her money then all three goods can be inferior.

7. (2 points) Suppose Eva's utility of coke c and pepsi p can be represented by the perfect substitutes utility function $U = 2c + 8p$. Suppose the price of pepsi is \$4/can and the price of coke is \$2/can. **Claim**: Eva would choose to spend all your money on coke since coke is cheaper than pepsi.

2 Multiple Choice Questions

Circle the best answer to each question. There is only one answer for each question. No explanation necessary.

8. (2 points) Ava is a PhD student on a small stipend. She knows she should not eat McDonald's so often but sometimes it is cheaper than healthier grocery store food. Suppose she eats at McDonald's 5 times a week, and she purchases and cooks healthier grocery store food twice a week. If her stipend were to increase, she would eat McDonald's less often. If the price of McDonald's were to increase, however, she would have to purchase grocery store food less often in order to be able to eat every day. Which option best describes McDonald's to Ava?

    A. Ordinary and Inferior.

    B. Ordinary and Normal.

    C. Giffen and Inferior.

    D. Giffen and Normal.

9. Suppose Avanti's demand for chipotle c and moes m is given by her utility function $U = c^{\frac{1}{2}}m^{\frac{1}{4}}$. Avanti faces prices p_c, p_m and income m.

    (a) (2 points) Which option best describes Avanti's optimal amount of chipotle?

    A. $c^* = \frac{1}{3} \cdot \frac{m}{p_m}$.

    B. $c^* = \frac{1}{3} \cdot \frac{m}{p_c}$.

    C. $c^* = \frac{2}{3} \cdot \frac{m}{p_c}$.

    D. $c^* = \frac{2}{3} \cdot \frac{m}{p_m}$.

    (b) (2 points) Which option best describes the relationship between chipotle and moes for Avanti?

    A. Substitutes.

    B. Complements.

    C. Neither.

    D. Perfect Substitutes.

10. (2 points) Suppose a consumer has preferences over two goods that can be represented as $U = x_1^2 + x_2$. (These are quasi-linear preferences we learned about and used in HW1.) The consumer faces prices p_1, p_2 and has income w. Which best describes the relationship between the two goods for the consumer?

    A. Complements.

    B. Substitutes.

    C. Neither.

    D. Perfect Substitutes.

11. (2 points) When prices are $(p1, p2) = (1, 2)$, a consumer demands $(x_1, x_2) = (1, 2)$. If prices are $(2, 1)$, which bundle **must** imply the consumer is not acting in accordance with utility maximizing behavior as we have learned in class.

    A. (2,3).

    B. (3,3).

    C. (2,1).

    D. (2,2).

3 Short Answer Questions

These questions all require an explanation. Remember you are trying to convince me you understand the why and the how of what you are doing, not simply getting the answer correct. Cite specific concepts from class in your answers for full credit.

12. **Labor Economics-Deriving Labor Supply.** Suppose Danielle cares about consumption c and leisure time (time not working) l. Suppose Danielle's utility function for consumption and leisure can be written as $U = c^{\frac{2}{3}} l^{\frac{1}{3}}$. Suppose Danielle receives an hourly wage w, the price of consumption is p_c, and Danielle only has 24 hours in each day.

    (a) (3 points) Write down Danielle's utility maximization problem including any constraints. **Hint**: It might be helpful to add an additional variable L as the amount of hours Danielle works, or her Labor hours as opposed to her $l$eisure hours.

    (b) (7 points) Find Danielle's utility maximizing bundle of the number of leisure hours, Labor hours, and amount of consumption. Show your work.

(c) (4 points) Which variables affect how many hours Danielle chooses to work? Do you think this is realistic? Explain why or why not.

(d) (6 points) Suppose instead we used a different utility function for Danielle. Now we will use Labor directly in her utility function in the following way.

$$U(c, L) = 3c^{\frac{1}{3}} - 3 - \frac{3}{4}L^{\frac{4}{3}}.$$

Why might this utility function still explain Danielle's preferences. Use marginal utilities in your answer.

(e) (7 points) Find Danielle's new labor supply curve using the utility function given in part d. How does it compare to the labor supply curve you found in part b?

13. **Economics of Education.** Suppose Lilly is thinking about how much schooling she should get. Assume her three options are bachelor's (4-years of school), masters (5-years of school), and PhD (8-years of school). When the price of a bachelor's is \$40,000/year, the price of a masters is \$50,000/year (\$160,000 for the bachelor's plus \$90,000 for the masters), and the price of a PhD is \$37,500/year (\$250,000 for the masters, \$50,000 in living expenses but the PhD tuition of \$100,000 is funded by the school and she does not need to pay this tuition).

    (a) (4 points) Suppose that with a bachelor's, Lilly could earn \$60,000 dollars per year. With a masters, Lilly would earn \$110,000 per year. With a PhD, Lilly would ear \$200,000 per year. What level of schooling would Lilly choose? Explain your answer.

(b) (4 points) Assume Lilly can just afford the option you picked in part a. Now suppose the school realizes they can not fund Lilly's PhD tuition, and Lilly decides to stop at a masters degree. Is this behavior consistent with the theory of utility maximization as we have learned in class? Explain your answer.

(c) (4 points) If this were true, why doesn't everyone get a PhD? What is something about this problem we have not included that could change Lilly's optimal choice? How might it change Lilly's optimal level of schooling?