Ecn 100 - Intermediate Microeconomics
University of California - Davis October 20, 2010
Instructor: John Parman

Midterm 1

You have until 11:50am to complete this exam. Be certain to put your name, id number and section on both the exam and your scantron sheet and fill in test form A on the scantron. Answer all multiple choice questions on your scantron sheet. Choose the single best answer for each question; if you fill in multiple answers for a question you will be marked wrong. Answer the short answer questions directly on the exam. You must show your work for full credit. Answers may be left as fractions. Please place a box around final answers when appropriate. Good luck!

Name: **ID Number:** **Section:**

SECTION I: MULTIPLE CHOICE (60 points)

1. Suppose that the marginal utility from apples and the marginal utility from oranges are always positive. If there are no goods other than apples and oranges, a consumer who is maximizing income will definitely:
   (a) Consume positive quantities of both apples and oranges.
   (b) Spend all of her income.
   (c) Both (a) and (b).
   (d) Neither (a) nor (b).
2. If Alex is always willing to trade four books for one CD or one CD for four books:
   (a) The marginal utility of a CD is always smaller than the marginal utility of a book.
   (b) The marginal utility of a CD is always greater than the marginal utility of a book.
   (c) The marginal rate of substitution is increasing as the number of CDs increases.
   (d) The marginal rate of substitution is decreasing as the number of CDs increases.
3. Suppose that the demand equation for candy is given by $C = \frac{2I}{3p_C}$ where I is income and p_C is the price of a candy. The demand equation for soda is given by $S = \frac{I}{3p_S}$ where p_S is the price of soda. On a graph with candy on the vertical axis and soda on the horizontal axis, the price offer curve when varying the price of candy will be:
   (a) A horizontal line.
   (b) An upward sloping curve.
   (c) A downward sloping curve.
   (d) A vertical line.
4. Brian is indifferent between getting the bundle (10 sandwiches, 20 sodas) and the bundle (20 sandwiches, 10 sodas). If Brian's preferences are convex, we can say for certain that:
   (a) Brian weakly prefers (15 sandwiches, 15 sodas) to (10 sandwiches, 20 sodas).
   (b) Brian weakly prefers (20 sandwiches, 10 sodas) to (15 sandwiches, 15 sodas).
   (c) Brian weakly prefers (10 sandwiches, 20 sodas) to (15 sandwiches, 15 sodas).
   (d) Not enough information.

5. On a graph with shoes on the horizontal axis and shirts on the vertical axis, an increase in the price of shoes would:

   (a) Make the indifference curves steeper.
   (b) Make the indifference curves flatter.
   (c) Make the budget line steeper.
   (d) Make the budget line flatter.

6. Which of the following pairs of utility functions represent the same preferences?

   (a) $U(x, y) = 2x + 2y$, $U(x, y) = -2x - 2y$.
   (b) $U(x, y) = 2xy$, $U(x, y) = x^2y^2$.
   (c) $U(x, y) = 2xy$, $U(x, y) = 2x + 2y$.
   (d) $U(x, y) = 2x + 2y$, $U(x, y) = 2x^2 + 2y^2$.

7. Suppose that tacos are an ordinary good and that tacos and salsa are complements. If the price of tacos goes down:

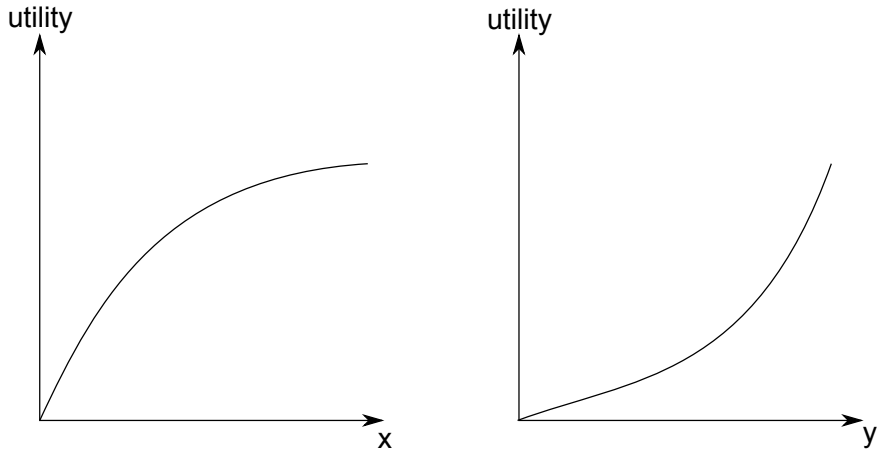
   (a) Spending on salsa will go up.
   (b) Spending on salsa will go down.
   (c) Consumption of tacos will go down.
   (d) Not enough information.

8. Christine is currently maximizing her utility by consuming a bundle with two books and two magazines. If her preferences are monotonic, then a bundle with two books and three magazines:

   (a) Is not in Christine's budget set.
   (b) Would give Christine a higher level of utility.
   (c) Both (a) and (b).
   (d) Neither (a) nor (b).

9. Doug is indifferent between all bundles on his budget line and prefers any of these bundles to any bundle below his budget line. Doug is currently maximizing his utility. If the price of good x is \$4 and the price of good y is \$8, then on a graph with x on the horizontal axis and y on the vertical axis:

   (a) Doug's indifference curve at his current bundle has a slope of -2.
   (b) Doug's indifference curve at his current bundle has a slope of $-\frac{1}{2}$.
   (c) Doug's marginal rate of substitution is diminishing when moving from left to right along his current indifference curve.
   (d) None of the above.



Use the figure above to answer questions 10 through 12. The graph on the left shows the relationship between x and utility holding y constant. The graph on the right shows the relationship between y and utility holding x constant.

10. Based on the two graphs, which of the following statements are true?
    (a) The marginal utility of x is increasing.
    (b) The marginal utility of y is increasing.
    (c) Both (a) and (b).
    (d) Neither (a) nor (b).

11. On a graph with x on the horizontal axis and y on the vertical axis, which of the following is definitely true?
    (a) The indifference curves would have a negative slope.
    (b) The indifference curves would have a positive slope.
    (c) The indifference curves would get steeper when moving from left to right.
    (d) The indifference curves would get flatter when moving from left to right.

12. Which of the following is true?
    (a) Both x and y are goods.
    (b) Both x and y are bads.
    (c) x is a good and y is a bad.
    (d) x is a bad and y is a good.

13. Suppose that the price of carrots doubles and the price of lettuce triples. If income also triples:
    (a) The set of affordable bundles will be larger than before any of the price and income changes.
    (b) The set of affordable bundles will be smaller than before any of the price and income changes.
    (c) There will be no change in the set of affordable bundles.
    (d) Some bundles will now be affordable that weren't affordable before and some bundles that were affordable before will no longer be affordable.

14. If comic books are an inferior good, the Engel curve for comic books will be:
    (a) Upward sloping.
    (b) Downward sloping.
    (c) A horizontal line.
    (d) A vertical line.
15. If Ellen considers tuna a good and sardines a bad and those are the only two things she can consume, Ellen will:
    (a) Spend all of her money on tuna.
    (b) Spend all of her money on sardines.
    (c) Spend money on both tuna and sardines but more on tuna than sardines.
    (d) Spend money on both tuna and sardines but more on sardines than tuna.

SECTION II: SHORT ANSWER (40 points)

1. (15 points) You have ten hours to study for a chemistry exam and a biology exam. If you spend B hours studying for biology and C hours studying for chemistry, your utility is given by:

$$U(B, C) = 10BC \tag{1}$$

   (a) Write down an equation for your budget constraint in terms of B and C. Note that your budget constraint will be in hours, not dollars.

   (b) Derive an expression for the marginal rate of substitution. Your marginal rate of substitution should be expressed as the change in biology study hours relative to a change in chemistry study hours. In other words, if you were willing to give up one hour of studying biology to get two more hours of study time for chemistry, the marginal rate of substitution would be $-\frac{1}{2}$.

   (c) Given your budget constraint from part (a) and your utility function, solve for the optimal way to divide your studying time. Be certain to show all of your work.

2. (10 points) The demand equation for video games is given by:

$$V = \frac{I}{p_V + \frac{p_V^2}{p_C}} \tag{2}$$

where V is the optimal number of video games, p_V is the price of a video game, p_C is the price of a CD, and I is income. The demand equation for CDs is given by:

$$C = \frac{I}{p_C + \frac{p_C^2}{p_V}} \tag{3}$$

where C is the optimal number of CDs. Suppose that the current price of a CD is \$10, the price of video game is \$20 and your current income is \$100.

(a) Draw the demand curve for video games. Label any intercepts and slopes with their numerical values whenever possible. Also be certain to clearly label the axes.

(b) Draw the Engel curve for CDs. Label any intercepts and slopes with their numerical values whenever possible. Also be certain to clearly label the axes.

3. (15 points) Gary always makes burgers by using one bun for every two hamburger patties. Every completed burger (one bun, two patties) gives Gary one additional unit of utility. Gary only gets utility from buns and patties by consuming them together. Any leftover buns or patties do not give Gary any additional utility. For example, if he has two buns and five patties, he would make two completed burgers giving him a total of two units of utility. The fifth patty would have no effect on his utility.
   (a) Write down a utility function that represents the utility Gary gets from B buns and H hamburger patties.
   (b) Gary currently has four buns and nine patties. What is the marginal utility of patties at this particular bundle?
   (c) On a graph with with buns on the horizontal axis and patties on the vertical axis, sketch the indifference curves for a utility level of 10 and a utility level of 20. Label any relevant intercepts, kinks and slopes with their numerical values.