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## Midterm 1

You have until 1:00pm 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 long 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!

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**Name:**

**ID Number:**

**Section:**

### SECTION I: MULTIPLE CHOICE (60 points)

- Suppose apples and bananas are perfect substitutes. On a graph with apples on the horizontal axis and bananas on the vertical axis, if the price of bananas doubles:
  - The indifference curves will get steeper.
  - The budget line will get steeper.
  - The indifference curves will get flatter.
  - The budget line will get flatter.
- Ansel likes dogs more than he likes cats, likes cats more than he likes snakes and likes snakes more than he likes dogs. We can say for certain that Ansel's preferences:
  - Are not monotonic.
  - Are not convex.
  - Are not transitive.
  - Are not complete.
- Suppose that an ice cream store gives you your first ice cream cone for free. After that, each ice cream cone costs \$1. Cookies cost \$2. If you consume only ice cream cones and cookies, the budget line on a graph with ice cream cones on the horizontal axis and cookies on the vertical axis will:
  - Have one segment that is a vertical line and one segment that has a slope of  $-.5$ .
  - Have one segment that is a horizontal line and one segment that has a slope of  $-2$ .
  - Have one segment that is a horizontal line and one segment that has a slope of  $-.5$ .
  - Have one segment that is a vertical line and one segment that has a slope of  $-2$ .
- The optimal quantity of chips is given by  $C = \frac{I}{2p_c + 4p_s}$  where  $I$  is income,  $p_c$  is the price of a bag of chips and  $p_s$  is the price of a can of soda. If the price of a can of soda goes up:
  - The Engel curve for chips will get steeper.
  - The Engel curve for chips will get flatter.
  - The Engel curve for chips will not change.
  - None of the above.

5. Suppose that Betty has well behaved convex preferences and is currently consuming a bundle that costs her entire income. At her current bundle, the marginal utility of  $x$  is twice the marginal utility of  $y$ . The price of  $x$  is \$4 and the price of  $y$  is \$1. Which of the following statements is true?
- (a) Betty is currently maximizing her utility given her budget constraint.
  - (b) Betty could increase her utility by moving down and to the right along her budget line.
  - (c) Betty could increase her utility by moving up and to the left along her budget line.
  - (d) Betty could increase her utility by moving down and to the right along her indifference curve.
6. Which of the following utility functions represents preferences for which extremes are preferred to averages?
- (a)  $U(x, y) = x^{\frac{1}{2}} + y^{\frac{1}{2}}$ .
  - (b)  $U(x, y) = \frac{1}{2}x^3 + y$ .
  - (c)  $U(x, y) = 3x^{\frac{1}{2}} + 3y^{\frac{1}{2}}$ .
  - (d) None of the above.
7. Which of the following changes would increase the set of affordable bundles?
- (a) Doubling the prices of both goods.
  - (b) Doubling the prices of both goods and doubling income.
  - (c) Doubling the price of one good and doubling income.
  - (d) None of the above.
8. Suppose that pollution and mosquitoes are both bads. The slope of an indifference curve on a graph with mosquitoes on the horizontal axis and pollution on the vertical axis:
- (a) Will be positive.
  - (b) Will be negative.
  - (c) Be a vertical line.
  - (d) Be a horizontal line.
9. Suppose  $x$  and  $y$  are both goods. On a graph with  $x$  on the horizontal axis and  $y$  on the vertical axis, you are currently at a bundle on the budget line (with positive quantities of both goods) where the slope of the indifference curve is steeper than the slope of the budget line. You can increase utility by:
- (a) Moving up and to the left along the budget line.
  - (b) Moving down and to the right along the budget line.
  - (c) Moving down and to the left.
  - (d) You are already maximizing utility.
10. Coffee and milk are complements (but not perfect complements). Increasing either coffee or milk increases utility. The slope of the price offer curve when the price of coffee is varied will be:
- (a) Positive for a graph with coffee on the horizontal axis and milk is on the vertical axis.
  - (b) Positive for a graph with milk on the horizontal axis and coffee on the vertical axis.
  - (c) Neither (a) nor (b).
  - (d) Both (a) and (b).

11. Suppose that the marginal utility from candy is always positive but diminishing as the amount of candy increases. The marginal utility from vegetables is constant and negative. Which of the following statements is true?
- (a) Utility will be maximized by spending all of a person's income on vegetables.
  - (b) The utility maximizing bundle will not use all of a person's income.
  - (c) The utility maximizing bundle will contain zero vegetables.
  - (d) None of the above.
12. If two bundles give a consumer the same utility:
- (a) They must be on the same indifference curve.
  - (b) They must cost the same amount of money.
  - (c) Both (a) and (b).
  - (d) Neither (a) nor (b).
13. Suppose that Chuck's utility maximizing bundle has 5 units of  $x$  and 10 units of  $y$  in it. If a bundle with 8 units of  $x$  and 8 units of  $y$  would give Chuck a higher level of utility, it must:
- (a) Lie below the budget line.
  - (b) Lie above the budget line.
  - (c) Lie on a lower indifference curve than Chuck's utility maximizing bundle.
  - (d) None of the above.
14. If we know that a person's preferences for salt and pepper are monotonic, we know that her indifference curves will be:
- (a) Convex.
  - (b) Concave.
  - (c) Upward sloping.
  - (d) Downward sloping.
15. Suppose that extra hot dogs always make us happier but the change in utility from an additional hot dog gets smaller as the number of hot dogs gets larger. A graph of utility as a function of hot dogs will have a \_\_\_\_\_ slope and a graph of marginal utility as a function of hot dogs will have a \_\_\_\_\_ slope.
- (a) Positive, positive.
  - (b) Positive, negative.
  - (c) Negative, positive.
  - (d) Negative, negative.

## SECTION II: SHORT ANSWER (40 points)

1. (20 points) Suppose that you have ten hours a week to watch TV. You can either watch comedies or dramas. Your utility from the number of comedies you watch ( $C$ ) and the number of dramas you watch ( $D$ ) is given by:

$$U(C, D) = C^{\frac{1}{2}} D^{\frac{1}{2}} \quad (1)$$

Comedies are half an hour long and dramas are one hour long.

- (a) Write down an equation giving your budget constraint in terms of the number of comedies you watch ( $C$ ) and the number of dramas you watch ( $D$ ). The only variables left in your equation should be  $C$  and  $D$ , everything else should be numbers. (Hint: Your budget will not be in terms of dollars.)
- (b) Derive expressions for the marginal utility of comedies ( $MU_C$ ), the marginal utility of dramas ( $MU_D$ ) and the marginal rate of substitution ( $MRS$ ).
- (c) Find the optimal number of comedies. Assume that you can choose to watch fractions of comedies and dramas (for example, you could decide to watch 9.3 comedies, you wouldn't have to watch either 9 or 10).

2. (20 points) Suppose that your utility from cups of coffee ( $C$ ) and cups of tea ( $T$ ) is given by:

$$U(C, T) = 10C + 5T \quad (2)$$

- (a) How many cups of coffee are you willing to trade for one cup of tea?
- (b) If the price of a cup of coffee is \$1, the price of a cup of tea is \$1 and your income is \$20, how many cups of coffee will you buy?
- (c) Graph the Engel curve for coffee and the Engel curve for tea when the price of a cup of coffee is \$1 and the price of a cup of tea is \$1. Use a separate graph for each Engel curve. Label intercepts and slopes with numerical values where possible.