

Name _____

1. (8 points) Suppose a consumer's preferences can be represented by a utility function,

$$U(x_1, x_2) = x_1^8 x_2^2.$$

Find the ordinary demand functions for goods one and two. Show your work.

2. (8 points) Suppose a consumer's preferences can be represented by a utility function,

$$U(x_1, x_2) = 3x_1^5 + 2x_2.$$

Find the compensated demand functions for goods one and two. Show your work.

3. (10 points) Consider the dual consumer's problem: minimize the cost of achieving a given level of utility (i.e., minimize $p_1 x_1 + p_2 x_2$ s.t. $U(x_1, x_2) = u$). Use words, graphs, and calculus to explain the solution of this problem. (In particular, explain what changes must be made if your conditions are not met.)

4. A consumer buys two goods, whose quantities are denoted x_1 and x_2 .

- a. (7 points) Suppose, first, that x_1 is a normal good. Using words and graphs, carefully explain how an increase in the price of x_1 can be broken down into a substitution effect and an income effect. Use this analysis to construct the demand curve for x_1 . Can you be sure that this demand curve slopes down? Explain.

- b. (7 points) Suppose, next, that x_1 is an inferior good. How might the answers to the questions above be different? Explain.

5. (5 points) How does the compensated demand curve differ from the ordinary demand curve? Explain in words and graphs.

6. (5 points) What is the meaning of a *value function*, and a *Lagrange multiplier*? Explain in terms of any economic constrained maximization or minimization problem.