

Slide your assignment under my office door by the time class is scheduled to end, i.e. 4:20.

Place your name on the back of this sheet of paper and nowhere else. Staple your answers face up on the front of this sheet of paper. Failure to follow these directions will cost you 10 points. If you use double-sided printing or print on the back of scrap paper, I will give you one additional point.

Show all work for all questions.

1) (15 points each) Answer each part in separate paragraphs. For each variable, do all tests to determine if it is a valid utility function for all quantities greater than zero. For the returns-to-scale test, do the formal test.

A) $U(A, B) = 8A^{1/2}B^{1/2}$

B) $U(C, D) = 100 - C^{-1/3}D^{-1/3}$

C) $U(E, F) = 8E^{2/3} + 8F^{2/3}$

2) (10 points each) Find a transformation which would make the mathematics simpler. Prove it is a valid transformation and find the transformation of the utility function.

A) $U(G, H) = 24G^{1/2}H^{1/4}$

B) $U(J, K) = 12J^{1/2}K^{1/3}$

3) (5 points) Suppose a question asks you to maximize utility subject to a budget constraint and then asks for you to find the marginal utility of \$1 of income. Can you do a transformation of the utility function? Explain your logic.

4) (30 points) Suppose your utility function of cats, dogs, and fish is given by $U(C, D, F) = 8C^{1/2}D^{1/4}F^{1/8}$. The price of a cat is \$4/C. The price of a dog is \$2/D. And price of a fish is \$16/F. If the income you plan to spend on pets is \$112, then how many of each will you buy?