

Place your name on the back of this sheet of paper and nowhere else. Staple your answers on the front of this sheet of paper. Failure to follow these directions will cost you 1 point. If you use double-sided printing or print on the back of scrap paper, I will give you one additional point.

1) (10 points each) For each of the following utility functions, determine if it is a valid utility function. If it is valid prove it. If it is not valid, prove it is not valid. (You do not need to do all tests in the latter case.) Show all work.

A) $F(X, Y) = 4X^{1/3}Y^{1/3}$

B) $F(H, T) = H^{-1/2}T^{-1/2}$

C) $F(D, V, E) = 5D^{1/3}V^{1/3}E^{1/3}$

2) (30 points) Find the amount of berries, corn, and deodorant which will maximize your utility if your utility function is $U(B, C, D) = B^{1/6}C^{1/3}D^{1/6}$ subject to berries cost \$1/B, corn costs \$2/C, deodorant costs \$1/D and your income is \$192. Find the level of utility. At that quantity. Show all work.

3) (30 points) Suppose your production function is given by $Q = (KL)^{1/2}$. If capital costs \$8/unit and labor costs \$2/unit, then what is the cost minimize total cost function if each unit uses \$3 of raw materials? Show all work.

4) (10 points) Examining your answers to questions #2 and #3, what is the economic reason why the two come out the same? Explain your logic.