

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.

Show all work on all questions and briefly explain what you did.

1) (10 points each) For each of the following utility functions, determine whether or not it is a valid utility function. Show all work and explain your logic. When doing the “returns to scale” test, do the full test, not the short-cut. If it fails one test, you can stop there and not do the rest of the tests.

A) $U(A, B, C) = 12A^{1/2}B^{1/3} + C^2$

B) $U(D, E) = 10D^{0.3}E^{-0.2}$

C) $U(F, G, H) = 4F^{1/4} + 4G^{1/4} + 4H^{1/4}$

D) $U(J, K) = \ln(3J \cdot K)$ (Ignore the returns to scale test)

2) (30 points) Maximize your utility if $U(F, M, V) = F^{1/3}M^{1/4}V^{1/4}$, your income is \$1000, the price of fruit is \$8/lb, the price of meat is \$3/lb, and vegetables cost \$6/lb. Show all work and do not worry about λ .

3) (30 points) Minimize your costs if your production function is $Q(L, K) = 4L^{1/4}K^{1/2}$, the wage rate is \$10/L and the rental rate is \$5/K. Show all work. Find the total cost, average total cost, and marginal cost functions as a function of Q. How much capital and labor do you use to produce 600 items?