

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 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)  $U(F, G, H) = 3F^{1/4} + 3G^{1/4} + 3H^{1/4}$

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

2) (25 points) Maximize your utility if your utility function is  $U(V, H) = 4V^{1/4}H^{1/2}$ , your income is \$600, violins cost \$4/violin, and hats cost \$2/hat. Show all work and do not worry about  $\lambda$ .

3) (35 points) Maximize your utility if  $U(F, M, V) = F^{1/3}M^{1/4}V^{1/4}$ , your income is \$800, 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  $\lambda$ .