

Do not write your name on the assignment. Write your name only on the back of this sheet of paper and staple your answers on the front of this sheet of paper. Your assignment will be typed, except graphs can be drawn by hand and mathematical equations can be done by hand. Failure to follow these directions will cost you 1 point on the assignment and failure to type it will cost you 10 points.

**For all questions, show all work.**

1) (10 points each) For each of the utility functions below, determine if it is a valid utility function.

A)  $U(A, B, C) = A^{1/4}B^{1/4}C^{1/4}$

B)  $U(D, E, F) = D^{1/3} + E^{1/3} + 1/F$ .

C)  $U(G, H) = G^{2/3}H^{2/3}$

D)  $U(I, J) = \ln(I*J)$

2) (25 points) Suppose the production function is given by  $Q = 9K^{1/3}L^{2/3}$ . What is the most output you can get for \$110 if capital costs \$2/K and labor costs \$5/L?

3) (35 points) Suppose labor costs \$3/L and capital costs \$4/K. If the production function is given by  $Q = 12KL$ , then treating  $Q$  as a constant, derive the total cost function of producing the quantity  $Q$ . Use that equation to derive the marginal cost and average total cost functions.