

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 and briefly explain all answers.**

1) (25 points) Suppose your utility function for hats and gloves is given by  $U(H, G) = 4H^{1/2}G^{1/2}$ . Hats cost \$40/hat and gloves cost \$10/pair. You have \$320 to spend. What is your budget constraint? How many of each should you buy? Approximately, what is the marginal utility of a dollar?

2) (25 points) Suppose your utility function for playing sports, P, and studying, S, is given by  $U(P, S) = 6P^{1/2}S^{1/3}$  and you have 10 hours to spend. What is your budget constraint? How much time should you spend doing each activity? Approximately, what is the marginal utility of an hour?

3) (25 points) Suppose capital costs \$2/hr and labor costs \$6/hr. The production function is  $Q(K, L) = 6K^{1/6}L^{1/2}$ . You want to make 96 items. What is your constraint? How much of each input should you use to minimize costs? Approximately, what is the marginal costs of one more unit of output?

4) (25 points) Suppose capital costs \$3/hr and labor costs \$6/hr. The production function is  $Q(K, L) = 8K^{1/2}L^{1/4}$ . You want to make 128 items. What is your constraint? How much of each input should you use to minimize costs? Approximately, what is the marginal costs of one more unit of output?