

MICROECONOMIC THEORY I

PROBLEM SET 5 DUE DATE:
FRIDAY, OCTOBER 18 BY 5:00PM
(SLIDE UNDER MY OFFICE DOOR OR SUBMIT VIA EMAIL)

Instructions: Please clearly identify your solution with **bold** or by circling so that I can easily see your answer. Print your entire name at the top left of every page. I will not accept late assignments. Staple or paperclip your answers to this handout. Write legibly.

Use the following production functions to answer questions 1-3:

$$q(K, L) = K^{\frac{1}{3}}L^{\frac{2}{3}} \quad (1)$$

$$q(K, L) = \left(\frac{K^{-2}}{2} + \frac{L^{-2}}{2} \right)^{-\frac{1}{2}} \quad (2)$$

1. The following questions primarily reference the marginal rate of technical substitution (MRTS):
 - (a) Derive the MRTS for each production function (assuming it exists) and evaluate whether it is diminishing. Rigorously verify your answer.
 - (b) What are the returns of scale of each production function? Verify your answer.
 - (c) Find the function, or the value of, the elasticity of substitution for each production function.
2. Find the conditional input demand functions, $K(r, w, q)$ and $L(r, w, q)$, and total cost function, $C(r, w, q)$, associated with each production function.
 - (a) Legislators pass a bill raising the minimum wage over the equilibrium wage. Rigorously show the long-run effect on both labor demand and capital demand. Are capital and labor substitutes or complements? Does the law of demand for labor hold for this production function?
 - (b) Rigorously evaluate the effect of the minimum wage law on total costs of production