

Name _____

1. A firm produces one output using two different inputs. Consider the problem of minimizing the cost of producing a given level of output, *i.e.*,

$$\begin{aligned} &\text{minimize } w_1x_1 + w_2x_2 \\ &\text{subject to } Q(x_1, x_2) = Q \end{aligned}$$

where x_1 and x_2 are the quantities of the two inputs, w_1 and w_2 are the given prices of the inputs, and $Q(x_1, x_2)$ is the production function.

- a. (15 points) Carefully explain how the firm chooses the amount of each of the inputs. Do this using words, graphs, and calculus.
- b. (10 points) Carefully explain how one can use the solution to the problem above to find the long run cost function $C(Q)$. What factors determine whether the *marginal cost* is increasing or decreasing? Explain carefully.

2. (15 points) A consumer's preferences can be represented by a utility function of the form $U(x_1, x_2) = 7x_1^2x_2^3$. Find the ordinary demand functions for each of the goods and calculate the *income* elasticity of demand *for good two*.

3. (10 points) A consumer buys a bundle of goods on the budget line for which

$$\frac{p_1}{p_2} > \frac{MU_1}{MU_2}.$$

Should the consumer buy more or less of good one? Should the consumer buy more or less of good two? Answer these questions first by continuing to use the term "utility" and second by comparing the "marginal benefit" of consuming good one to the "marginal cost." Explain carefully. Draw a graph to show where the consumer is operating and where the consumer should be operating.