

Problem Set Two

EC201

Problem 1. True/False: We cannot compose a function with a random variable because a random variable is not a function

Problem 2. True/False: Price is a component of the firm's choice set

Problem 3. What would it mean if indifference curves of a consumer intersect?

Problem 4. Explain why a firm might not be trying to maximize their current profit?

Problem 5. In class, we modeled a firm as producing a single good which they can sell for at some price $p > 0$. How might we extend this model to account for situations where in addition to producing a good or service that the firm can sell, they also produce wastes that they may have to pay to dispose of?

Problem 6. Consider the following Utility Function:

$$U(x_1, x_2) = 2x_1^{0.5}x_2^{0.5}$$

At the bundle (2,3), a consumer with the above utility function is approximately willing to trade-off one additional unit of x_1 for how many units of x_2 ? Would this tradeoff vary if we changed the consumer's utility function by composing it with a strictly monotonic function?

$$V = m \circ U, \quad \frac{d}{dx}m(x) > 0 \quad \forall x$$

Problem 7. Consider the following endowment: $(m_1, m_2) = (4, 10)$, where m_1 represents the endowment in the first period and m_2 represents the endowment in the second period. Given borrowing rates of 0.15 and a savings rate of (0.01) what is the present value of the bundle? Does the present value of the bundle increase as we increase the savings rate?

Problem 8. Explain the economic interpretation of the following function, where F is the production function of a firm.

$$\partial_K \partial_K \partial_L F(L, K)$$

Problem 9. In class we discussed the idea of the law of diminishing marginal products. What does this law suggest about the slope of indifference curves?

Problem 10. On the first day of your job as an Economist at Uber, your manager comes to you with the following information: They estimated the relationship between the base price that a driver receives (p) and the number of hours a driver will work for (h).

$$W :: \text{Price} \rightarrow \text{Hours}$$

Your manager says that they would like to know the rate of change of costs with respect to number of hours worked. Is this feasible with the information provided? Explain.

Problem Bonus. Some columnists have lamented that teachers are leaving positions in response to Covid-19 because the classroom environment has become more difficult. As Chief Economist of the Education Department, you are concerned about this potential issue, but what other effect of Covid-19 might have a longer lasting impact on the teacher shortage?