

Econ 201 Midterm 2

Fall 2020

Student Name:

There are 5 questions. You have 120 minutes to complete the exam. Please, read the questions carefully and show your work. Good Luck!

- 1) (25 points) Find the supply function as well as the unconditional factor demand functions for capital and labor for a firm which has a production function

$$f(K, L) = \ln K + \sqrt{L}.$$

- 2) (20 points) Suppose there are two goods (Good x is a giffen good and Good y is a normal good). Define and illustrate compensating variation and equivalent variation for a price increase on a giffen Good x (Just drawing the diagrams will be enough for each definition). Compare consumer surplus, equivalent variation, and compensating variation for a price increase on the giffen Good x (Just drawing a diagram and comparing CS, EV and CV will be enough).

- 3) (15 points) Consider the following maximization problem:

$$\max U(x_1, x_2) = [-(x_1 - 2)^2 - (x_2 - 3)^2] \text{ subject to } x_1 + x_2 \leq 5 \text{ and } x_1 + 2x_2 \leq 8.$$

- a) (5 points) Illustrate the constrained optimization problem using a graph (Draw indifference curves and the constraint set)
- b) (5 points) Form the Lagrangian function and state the Kuhn-Tucker necessary conditions.
- c) (5 points) Find the solution to the optimization problem using the Kuhn-Tucker conditions.
- 4) (20 points) Suppose the production function is given by $f(K, L) = 3KL$, where K denotes capital and L denotes labor. The price of capital is 2 TL/machine-hr, the price of labor is 24 TL/person-hr, and capital is fixed at 4 machine-hr in the short run.
- a) Find the short-run TC, TVC, and TFC curves for this production process. Sketch them on a single graph. Do not forget to label all axes and necessary points on your graph.
- b) Find short-run ATC, AVC, AFC, and MC curves for this production process. Sketch them on a single figure. Do not forget to label all axes and necessary points on your graph.
- 5) (20 points) Consider an exchange economy with two consumers and two goods such that $U_i(x_{1i}, x_{2i}) = \max \{x_{1i}, x_{2i}\}$ for $i \in \{1, 2\}$. Suppose the initial endowment of agent $i \in \{1, 2\}$ is $w_i = (1, \alpha)$ where $\alpha > 0$. Find the set of Pareto efficient allocations and demonstrate the allocations in the Edgeworth box.