Econ 1110: Intermediate Microeconomics (S01)
Midterm Exam

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9-10:20am

Name:

- Please fill in your name in the box above.
- There are four questions, on p2-6. You should answer all four.
- All answers go in this booklet on p2-6. Show your intermediate steps in your answers wherever possible to help us decide on partial credit if needed.
- There is scratch paper on p7 if you need it, but nothing on p7 is graded.
- You enter with 1 point since the typo counter hit 10: congratulations! There are 99 points available on the exam, for a total of 100.
- Don’t cheat!
- Don’t panic!
1 Consumer choice

a) (10 points) Find the optimal choice of consumption bundle for a consumer with well-behaved preferences represented by the utility function \( u(x_1, x_2) = 2 \ln(x_1) + 2x_2 \) who faces a standard budget constraint defined by income \( m = 20 \) and prices \( p_1 = 2 \) and \( p_2 = 4 \).

b) (12 points) Say that a consumer has a utility function \( u = \min\{x_1, x_2\} \). That is, for this consumer, the two goods are perfect complements. Write the consumer’s demand functions for good 1 and good 2, assuming that she always faces a standard budget constraint with prices \( p_1 \) and \( p_2 \) and has income \( m \). Are these goods normal or inferior? Are they ordinary or Giffen?
2 Optimal choice with a nonstandard budget

Consider a consumer who has income of 5 to spend on two goods $x_1$ and $x_2$. The price of good 2 is 1, and the price of good 1 is 1 for the first two units purchased and 3 thereafter. The consumer’s well-behaved preferences can be represented by the utility function $u = x_1 x_2$.

a) (10 points) Sketch the budget constraint. Label the axes, slopes, and intercept.

b) (12 points) Find the consumer’s optimal choice of consumption bundle. Mark it on your diagram and sketch the indifference curve for the consumer that the optimal choice lies on, paying special attention to how the slope of the indifference curve looks at and around the optimal choice. Explain how you know that the point you found is the optimal choice.
3 Good sandwich, bad sandwich

An exchange economy has two consumers, Jim (J) and Avram (A), and two goods, Subway sandwiches (s) and Italian Corner sandwiches (i). Jim has an endowment of one Subway sandwich and no Italian Corner sandwiches, and Avram has an endowment of one Subway sandwich and one Italian Corner sandwich.

a) (10 points) Sketch an Edgeworth box to illustrate the feasible allocations in this economy. Put s on the horizontal axes and i on the vertical axes. Remember to fully label your diagram and make it large enough to add to later.

b) (5 points) Mark the endowment point on your diagram from a).

Jim likes i but dislikes s. Avram, inexplicably, likes both s and i. Their utility functions are

\[ U_J = i_J - s_J, \]
\[ U_A = s_A + i_A \]

Each consumer must consume a non-negative amount of each good.

c) (5 points) On your diagram from a), sketch an indifference curve for each consumer that passes through the endowment point.
d) (6 points) Illustrate on your diagram which feasible allocations represent Pareto improvements over the endowment point.

e) (6 points) Illustrate on your diagram the Pareto efficient allocation(s) in this economy.

f) (8 points) Find a competitive equilibrium in this economy.
4 Welfare theorems

The Second Theorem of Welfare Economics says that, under some conditions that guarantee the existence of competitive equilibria, every Pareto efficient allocation can be achieved as a competitive equilibrium, if we make a particular change to the starting conditions of the economy.

a) (5 points) What is the particular change in starting conditions that lets us achieve the outcome of the Second Theorem? Why is it hard to implement the real-world equivalent of this change?

b) (10 points) Illustrate with an Edgeworth box the idea of the Second Theorem in action. In a couple of sentences, explain what is going on in your diagram.
Scratch paper