ECON 203
Midterm on Consumer Theory

Be sure to show your work for all answers, even if the work is simple.

This exam will begin at 19:40 and end at 21:20

1. *(16 points)* **Honor Statement:** Please read and sign the following statement:

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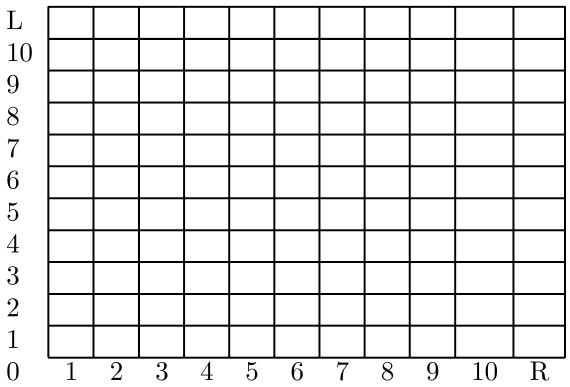
2. *(7 points)* Define a *corner solution* to a utility maximization problem. Are corner solutions common or rare in reality? Explain your answer. (Hard) Why do we usually ignore corner solutions in our analysis? (It might help to think about perfect substitutes when answering this.)

3. *(10 points)* Explain the *motivation* for Economists to assume rationality. Give an example of how not assuming rationality can lead to bad analysis and/or decisions. (You do not have to use the one I gave in class. It probably would be easier to think up one on your own.)

4. *(19 points total)* Lefty Wrightson is an odd fellow because he has 1 Left foot and 2 Right feet. Fortunately he's Scottish so he just wears kilts all the time, but he has a real problem with finding shoes. He has a budget of I euros to spend on shoes, and each left shoe costs p_l and each right shoe costs p_r.

   (a) *(3 points)* Explain why we can represent his utility for shoes as $U(L, R) = \min(L, 2R)$ where L is the number of left shoes he buys and R is the number of right shoes.

   (b) *(3 points)* In the graph below carefully draw an indifference curve for Lefty where $U(L, R) = \min(L, 2R) = 1$. The number is associated with the line to the right or above.



   (c) *(5 points)* Since the price of both left and right shoes is strictly positive, what do we know about the ratio of left to right shoes he will buy?

(d) *(8 points)* Find his demand for both right and left shoes.

5. *(8 points)* For **either** the axiom of preferences *montonicity* or *convexity*. **(Warning: If you try to answer both axioms I can choose whichever one I want to grade.)**

   (a) *(2 points)* Define the axiom.

   (b) *(3 points)* Give a real world example showing that preferences do not always satisfy this axiom.

(c) *(3 points)* Explain what it implies in terms of indifference curves, including showing how the axiom fails if the indifference curve does not satisfy your restriction.

6. *(26 points total)* The duality theorem tells us that $X\left(p_x, p_y, I\left(p_x, p_y, U\right)\right) = h_x\left(p_x, p_y, U\right)$ where $X\left(p_x, p_y, I\right)$ is the Marshallian or normal demand for X, $h_x\left(p_x, p_y, U\right)$ is the Hicksian or income compensated demand for X, and $I\left(p_x, p_y, U\right)$ is the optimal expenditure to reach a utility level of U.

   (a) *(6 points)* Derive the Slutsky equation in elasticity form with regards to p_y (NOT p_x). You may use the envelope theorem, which tells us that $\partial I\left(p_x, p_y, U\right)/\partial p_x = X$ and $\partial I\left(p_x, p_y, U\right)/\partial p_y = Y$.

(b) *(8 points)* Give the physical definition of each term in the Slutsky equation and discuss which terms illustrate which of the two effects on Marshallian demand.

(c) *(12 points total)* Assume that a person has Cobb-Douglass preferences, and the demand for X is $X = \frac{1}{4}\frac{I}{p_x}$ and for Y is $Y = \frac{1}{6}\frac{I}{p_y}$.

i. *(8 points)* Find the elasticity of X with regards to p_y, I, and the share of income this person spends on X. (The result with regards to p_y might surprise you at first.) Do the same for Y, except find the elasticity of Y with regards to the price of X.

ii. *(4 points)* Using the Slutsky equation, derive a precise value for the Hicksian elasticity of X with regards to the price of Y. Are X and Y net substitutes or compliments? Notice this is true for all Cobb-Douglass preferences.

7. *(8 points)* A friend of yours needs a new pair of jeans which cost 200 TL. However this friend also found an awesome shirt that he or she really wants for 300 TL. Using the concept of utility and the bang for the buck, explain to your friend what she or he needs to think about in order to decide which to buy. (See, Laman, utility theory is actually useful.)

8. *(6 points)* As I explained in class, in both Microeconomics and Macroeconomics we almost always assume that people have Costant Elasticity of Subtitution (CES) utility functions. What is the income elasticity of all goods when a person has CES utility? Why might you want to make this implicit assumption? (It might help you to think about economic development in Macroeconomics.)

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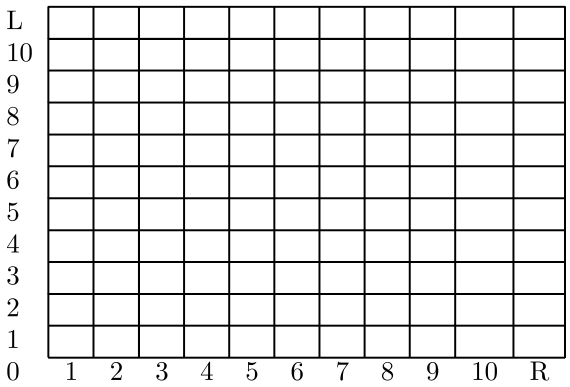
2. *(7 points)* Define a *corner solution* to a utility maximization problem. Are corner solutions common or rare in reality? Explain your answer. (Hard) Why do we usually ignore corner solutions in our analysis? (It might help to think about perfect substitutes when answering this.)

3. *(10 points)* Explain the *motivation* for Economists to assume rationality. Give an example of how not assuming rationality can lead to bad analysis and/or decisions. (You do not have to use the one I gave in class. It probably would be easier to think up one on your own.)

4. *(19 points total)* Lefty Wrightson is an odd fellow because he has 1 Left foot and 3 Right feet. Fortunately he's Scottish so he just wears kilts all the time, but he has a real problem with finding shoes. He has a budget of I euros to spend on shoes, and each left shoe costs p_l and each right shoe costs p_r.

   (a) *(3 points)* Explain why we can represent his utility for shoes as $U(L, R) = \min(L, 3R)$ where L is the number of left shoes he buys and R is the number of right shoes.

   (b) *(3 points)* In the graph below carefully draw an indifference curve for Lefty where $U(L, R) = \min(L, 3R) = 1$. The number is associated with the line to the right or above.



   (c) *(5 points)* Since the price of both left and right shoes is strictly positive, what do we know about the ratio of left to right shoes he will buy?

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5. *(8 points)* For **either** the axiom of preferences *montonicity* or *convexity*. **(Warning: If you try to answer both axioms I can choose whichever one I want to grade.)**

   (a) (*2 points)* Define the axiom.

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6. *(26 points total)* The duality theorem tells us that $X\left(p_x, p_y, I\left(p_x, p_y, U\right)\right) = h_x\left(p_x, p_y, U\right)$ where $X\left(p_x, p_y, I\right)$ is the Marshallian or normal demand for X, $h_x\left(p_x, p_y, U\right)$ is the Hicksian or income compensated demand for X, and $I\left(p_x, p_y, U\right)$ is the optimal expenditure to reach a utility level of U.

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(b) *(8 points)* Give the physical definition of each term in the Slutsky equation and discuss which terms illustrate which of the two effects on Marshallian demand.

(c) *(12 points total)* Assume that a person has Cobb-Douglass preferences, and the demand for X is $X = \frac{1}{3}\frac{I}{p_x}$ and for Y is $Y = \frac{1}{5}\frac{I}{p_y}$.

i. *(8 points)* Find the elasticity of X with regards to p_y, I, and the share of income this person spends on X. (The result with regards to p_y might surprise you at first.) Do the same for Y, except find the elasticity of Y with regards to the price of X.

ii. *(4 points)* Using the Slutsky equation, derive a precise value for the Hicksian elasticity of X with regards to the price of Y. Are X and Y net substitutes or compliments? Notice this is true for all Cobb-Douglass preferences.

7. *(8 points)* A friend of yours needs a new pair of jeans which cost 200 TL. However this friend also found an awesome shirt that he or she really wants for 300 TL. Using the concept of utility and the bang for the buck, explain to your friend what she or he needs to think about in order to decide which to buy. (See, Laman, utility theory is actually useful.)

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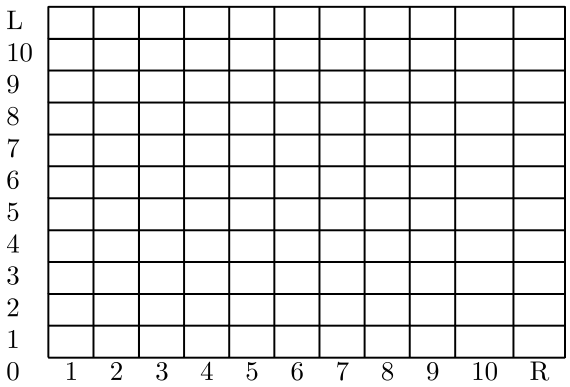
4. *(19 points total)* Lefty Wrightson is an odd fellow because he has 4 Left feet and 1 Right foot. Fortunately he's Scottish so he just wears kilts all the time, but he has a real problem with finding shoes. He has a budget of I euros to spend on shoes, and each left shoe costs p_l and each right shoe costs p_r.

   (a) *(3 points)* Explain why we can represent his utility for shoes as $U(L, R) = \min(4L, R)$ where L is the number of left shoes he buys and R is the number of right shoes.

   (b) *(3 points)* In the graph below carefully draw an indifference curve for Lefty where $U(L, R) = \min(4L, R) = 1$. The number is associated with the line to the right or above.



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(c) *(12 points total)* Assume that a person has Cobb-Douglass preferences, and the demand for X is $X = \frac{1}{6}\frac{I}{p_x}$ and for Y is $Y = \frac{1}{4}\frac{I}{p_y}$.

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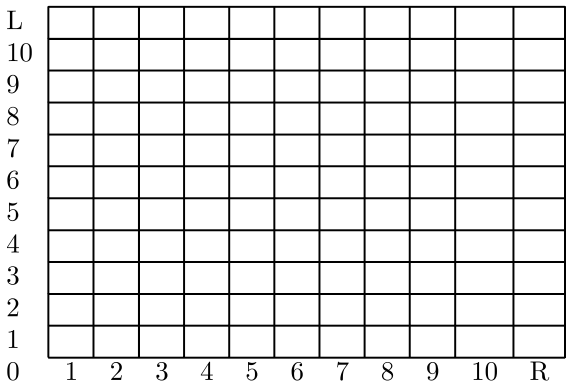

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