Economics 304 **Test 1**

Due by email by 11:59pm on Sunday February 13th.

This test is open note and open book, however, you are not allowed to consult other people, such as classmates, etc. That is, it is not "open people." When you email me the test, please also confirm that you did not get any direct assistance from another person on the test questions.

Note the number of points for each question. For any questions that involve graphs or calculations be sure to write clearly and show your work. Be specific and err on the side of including an explanation. You may either hand write or type answers that do not involve graphs. It is very difficult to grade answers that I can't read.

1) (10 pts total) In producer theory we talked the idea of a production function.

a) Using this concept, explain an **education production function**. Be clear on the inputs and the output.

b) Chose an input in your education production function and explain whether you think it is decreasing, constant or increasing returns to scale.

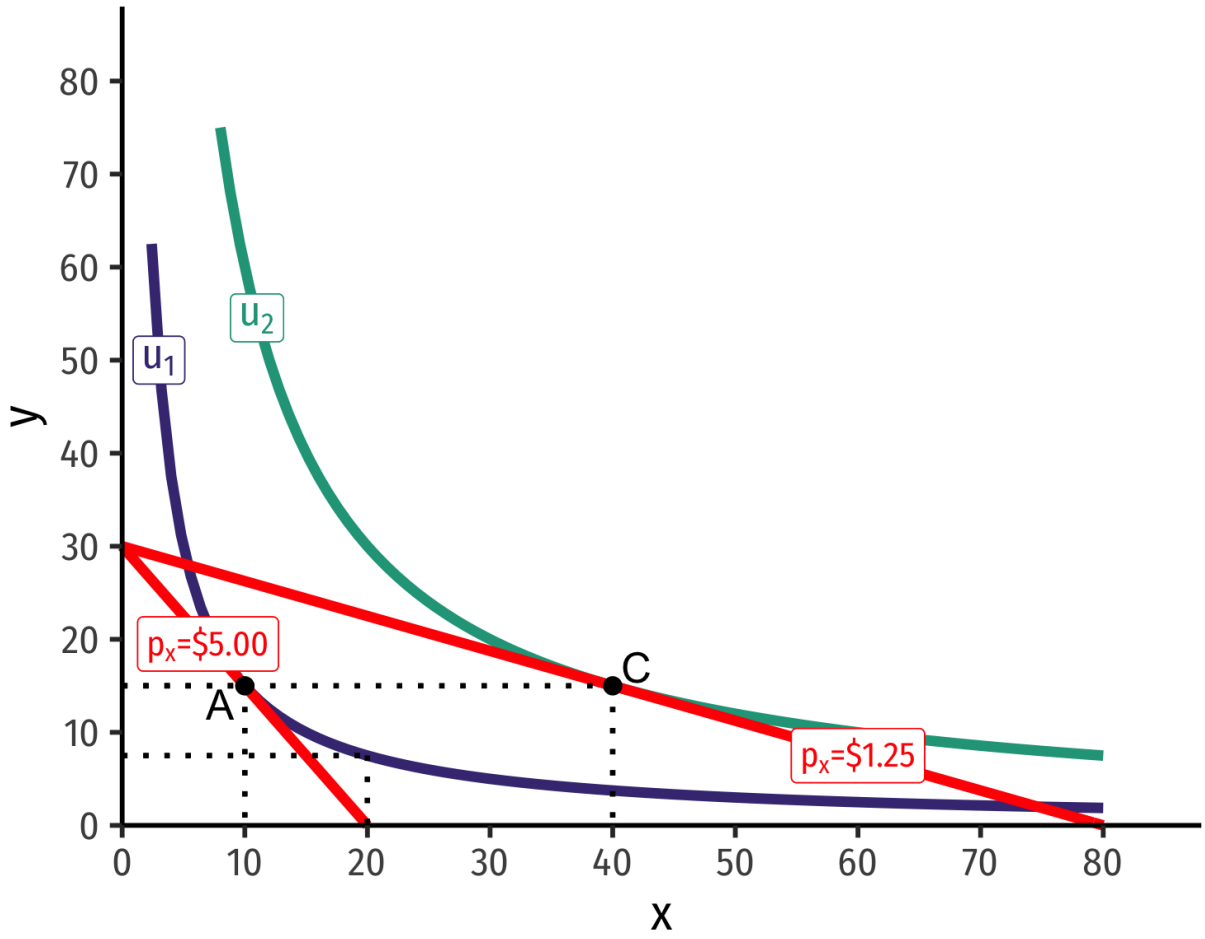
2) (10 pts) The shape of indifference curves tells us a lot about the preferences that individuals have for 2 goods. On a graph where coffee is on the y-axis and chocolate is on the x-axis, draw an indifference curve for a) Christie who has a strong preference for coffee and weak preference for chocolate and b) Carla who has a strong preference for chocolate and a weak preference for coffee. Describe your rationale for the shape of each indifference curve.

3) (25 pts total) Either print the graph below, or recreate it on your own paper. It shows the indifference curves and budget constraint for an individual consuming good X and Y. The person has $100 of "Vegas money" to spend and the price of Y is $3.33. When the price of good X is $5 their optimal consumption bundle is at A (20, 15), and when the price of X decreases to $1.25 they choose consumption bundle C (40,10).

A) Describe the economic rationale on <u>why</u> consumption bundle A the optimal choice when the price of X is $5. Be clear and use an equation.

B) On the graph below, show the income, substitution and total effect <u>from the price reduction</u> for good X.

C) Is good X a normal or inferior good? Explain



Optima with $u(x, y) = x^{0.5}y^{0.5}$, $m = 100$, $p_y = 3.33$

5) (20 pts total) Mad Max's Road Warriors fix potholes on interstate highways. Max's road crews fill potholes using workers and shovels in 1 to 1 correspondence. A worker with 1 shovel can fill 10 potholes in a day. A worker with 2 shovels can still only fill 10 potholes, as can 2 workers with 1 shovel. Draw your own graphs to answer each of the following questions.

A) Draw the production isoquant corresponding to filling 30 potholes.

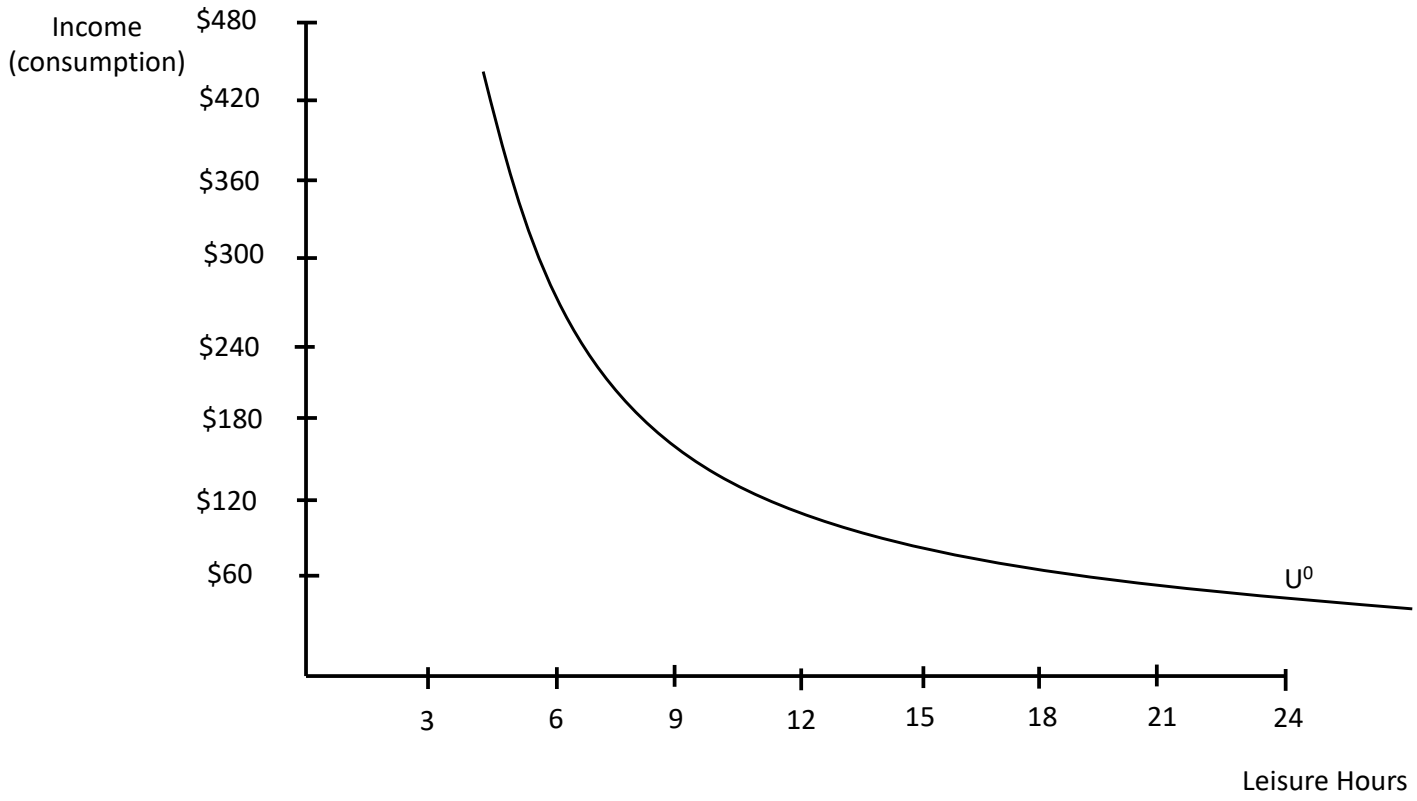
B) Assume that production displays constant returns to scale. Explain the concept of constant returns to scale and draw a few more isoquants.

C) If shovels rent for $5, and workers must be paid $25, draw several isocost lines by assuming a level of cost.

D) If Mad Max has received a state contract to fill 60 potholes, what is the minimum cost at which it can fulfill the contract? Show your work.

6) (15 pts total) Consider the labor-leisure model discussed in class. [Remember: Labor is the opposite of leisure] To answer each question, either print the graph below or recreate it on your own paper.

A) Draw and label the constraint with wages at $10 per hour.
B) Draw and label a new constraint when the person gets a cash payment regardless of if they work of $200 and a wage of $10 per hour. You can think of this as a version of universal basic income.
C) Draw ***your*** preferences (indifference curve) for the constraint in part B. What is ***your*** optimal decision on how much to work? Why?



7) (20 pts total) Consider the Rosen-Roback spatial equilibrium model discussed in class. Draw a graph where the y-axis is housing or land prices and the x-axis is wages, and show the impact of an increase in nuisance flooding. Nuisance flooding is defined as the temporary inundation of low-lying areas, especially streets, with flood water during exceptionally high tide events. Nuisance flooding is a disamenity to workers and a counter-productive amenity for firms. Explain in words and on the graph any shifts that happen.