Economics 11 Caltech Spring 2010

QUIZ 3

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Following the Honor code, you should find 20 minutes and do the quiz, by yourself and without using any notes. Paper and pen should be all you need. Turn it in by Thursday 4-22 5pm. (drop off in lecture or in box in front of Baxter 133).
Each quiz is worth 6pts (for 48 out of 200 possible pts for all 8 quizzes)

The answers to the whole homework will be available Friday at 2pm.
**Definition (use words not equations)**

3 lines or less

1pt Please explain Contract curve.

The set of allocations such that marginal rates of substitution of both parties are equal

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**Word problem**

2pts True or False: Please explain each question in a few sentences.

A firm’s marginal rate of technical substitution captures the firm’s willingness to trade capital for labor, but not the degree to which capital and labor are substitutes in supply.

*This statement is true. The MRTS is the absolute value of the slope of the isoquant, so it measures the amount of capital that the firm is willing to give up for one unit of labor, in order to maintain the same level of production. This is not the same thing as measuring the degree to which capital and labor are substitutes or Complements.*

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Technical problem

1. Assume a two person, two good exchange economy.

Ms. Blue’s utility function for goods x and y is given by: \( U_b = x^{0.7}y^{0.3} \).

Ms. Red’s utility function for goods x and y is given by: \( U_r = x^{0.5}y^{0.5} \).

Blue has 40 ounces of x and 20 ounces of y. Red has 20 ounces of x and 60 ounces of y.

a) What are the demands of for X and Y by Blue and Red as a function of prices and incomes.

b) If the price of X is fixed at 1, then what are the income of Ms Blue and Ms Red as a function of \( P_y \).

c) Blue and Red can trade at a market price as price-takers with \( P_x = 1 \). Using the information above determine the equilibrium price of y. What is the final allocation of x and y?

Utility functions are cobb douglass so demand for X and Y are

\[
\begin{align*}
X_b &= 0.7I_b/P_x, \quad Y_b = 0.3I_b/P_y \\
X_r &= 0.5I_r/P_x, \quad Y_r = 0.5I_r/P_y
\end{align*}
\]

\[\begin{align*}
I_b &= 40 + 20P_y, \quad I_r = 20 + 60P_y
\end{align*}\]

\[\begin{align*}
X &= 40 + 20 = X_b + X_r = 0.7I_b/P_x + 0.5I_r/P_x \\
Y &= 20 + 60 = Y_b + Y_r = 0.3I_b/P_y + 0.3I_r/P_y
\end{align*}\]

\[\begin{align*}
60 &= 0.7I_b + 0.5I_r = 0.7(40 + 20P_y) + 0.5(20 + 60P_y) \\
&\Rightarrow 60 - 28 - 10 = 14y + 30P_y \\
&\Rightarrow 22 = 44P_y \Rightarrow P_y = 0.5
\end{align*}\]

Then \( I_b = 40 + 10 = 50 \), \( I_r = 20 + 30 = 50 \)

\[\begin{align*}
X_b &= 0.7I_b/P_x = 0.7*50/1 = 35, \quad Y_b = 0.3I_b/P_y = 0.3*50/0.5 = 30 \\
X_r &= 0.5I_r/P_x = 0.5*50/1 = 25, \quad Y_r = 0.5I_r/P_y = 0.5*50/0.5 = 50
\end{align*}\]