Midterm - Part II - Questions 5 and 6 - 45 Points

Econ 50 - Stanford University - Winter Quarter 2014/15

February 9, 2015

Write your name and your TA's name (**Rui** Xu, **Michael** Zhang, or **Connor** Scherer), and sign the statement on the cover of the exam (below).

"The answers written on these pages are entirely my own. I attest that in taking this exam, I am fully complying with all provisions of Stanford's Fundamental Standard and Honor Code."

Signature:

Printed Name:

TA's Name:

Please do not open this exam until it is time to begin. Good luck!

For Questions 5 and 6, suppose Wilson's preferences over X and Y are summarized by the utility function

$$u(x, y) = \frac{xy}{x + y}$$

which has an associated marginal rate of substitution of

$$MRS_{x,y} = \frac{y^2}{x^2}$$

As usual, he has a total of $\$I$ available to spend on X and Y at prices P_x and P_y per unit, respectively.

Question 5: Utility function deep dive: Demand derivations [20 points]

(a) Derive Wilson's **Marshallian demand functions**, $x^*(P_x, P_y, I)$ and $y^*(P_x, P_y, I)$. [10 points]

(b) Write down expressions for Wilson's **indirect utility function** $V(P_x, P_y, I)$, and his **expenditure function** $E(P_x, P_y, U)$. [5 points]

(c) Write down expressions for Wilson's **Hicksian demand functions**, $x^H(P_x, P_y, U)$ and $y^H(P_x, P_y, U)$. [5 points]

Question 6: Utility function deep dive: Comparative statics analysis (25 points)

Now assume Wilson's income is $I = \$288$ and the price of good Y is $P_y = \$1$ per unit. This question will ask you to carefully analyze the effect of a price decrease in P_x from $9 to $4 per unit.

(a) Find the quantity of X and Y that Wilson will choose to buy if $P_x = 9$ and if $P_x = 4$. Use these two points to sketch a reasonable price-consumption curve for X (i.e., PCC_X) and (Marshallian) demand curve in two carefully-drawn diagrams. *Be sure to label your axes!* [8 points]

(b) Does Wilson view these two goods as complements or substitutes? How do you know? [2 points]

(c) On a carefully drawn Slutsky diagram, show the effect of a price change from $P_x = 9$ to $P_x = 4$. Label your initial point A, the final point C, and the Slutsky decomposition point B. Clearly show the coordinates for those points, as well as the coordinates of the intercepts of all relevant budget lines. [10 points]

(d) Compute the **compensating variation** and **equivalent variation** for this price change. [5 points]

(e) Extra credit: On the back of this sheet, illustrate the compensating variation in a diagram showing the relevant Marshallian and Hicksian demand curves. [+5 points]