PUAF 8216 Microeconomics Section 3
Lab Summary 3
22 September 2000

1. Identities and Conditions. It is very important to distinguish between an *identity* (a definition which holds true all the time) and a *condition* (which is true only in a specific situation). For our purposes:

- The Marginal Rate of Substitution, $MRS = -\frac{U_x}{U_y} = -\frac{MU_x}{MU_y} = -\frac{dU/dx}{dU/dy}$, is an *identity* that always tells us the slope of the indifference curve. It tells us how much extra of good *y* we must be compensated with in order to stay indifferent if we were to give up one unit of good *x*.
- The slope of the budget curve, $-\frac{P_x}{P_y}$, is an *identity* that tells us how much extra of good *y* we can afford if we were to give up one unit of good *x*.
- The equality, $MRS = -\frac{P_x}{P_y}$, is a *condition* that only holds true at the utility-maximizing consumption bundle.

2. Utility Maximization Problem. In order to solve for specific values for *x* and *y*, you must use four things. Always check that you have made use of:

- P_x, the price of good *x*.
- P_y, the price of good *y*.
- *M*, the budget constraint.
- *U*, the utility function.

3. Solving a Two-Good Utility Maximization Problem. Given *M*, P_x, P_y and *U*:

- Find *MRS* in terms of *x* and *y*.
- Equate *MRS* to $-\frac{P_x}{P_y}$. Find either "*y* in terms of *x*" or "*x* in terms of *y*".
- Substitute into the budget constraint, *M*, so that we only have one unknown.
- Solve for the unknown (either *x* or *y* depending on which you chose earlier).
- Once you have solved for a numerical value for either *x* or *y*, then you can further solve for the other unknown (from the result in the second step).

4. Solving a Three-Good Utility Maximization Problem. Given M, P_x, P_y, P_z and U:

- Find U_x, U_y and U_z.
- Knowing the general utility-maximizing condition $\frac{U_x}{P_x} = \frac{U_y}{P_y} = \frac{U_z}{P_z}$, work with two pairs of equalities separately in order to express two unknowns as a function of the third. (For example, express x and y in terms of z.)
- Substitute into the budget constraint, M, so that we only have one unknown.
- Once you have solved for a numerical value for that unknown then you can further solve for the other two.

5. Revealed Preferences without a Utility Function. Suppose we are given an individual's budget constraints M_0, P_{x0} and P_{y0}, and we are told that he is maximizing his utility at the bundle (x_0,y_0). Then we are told that the budget constraints have changed to M_1, P_{x1} and P_{y1}, and that he now consumes the bundle (x_1,y_1). How do we decide if (x_1,y_1) is a rational bundle?

- Is the new bundle affordable under the old budget constraints?
  i.e. $x_1 \cdot P_{x0} + {}_{y1} \cdot P_{y0} \leq M_0$?
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If the answers to both those questions are yes, then the new bundle (x_1,y_1) must be irrational. From the first part, we know that (x_0,y_0) is revealed-preferred to (x_1,y_1). That is to say, whenever (x_0,y_0) and (x_1,y_1) are affordable, he must rationally choose (x_0,y_0) over (x_1,y_1). From the second part, we know that both (x_0,y_0) and (x_1,y_1) are affordable under the new budget constraints. Therefore, he must rationally choose (x_0,y_0). Since he chose (x_1,y_1) instead, then he must be irrational.