Economics 302
Microeconomic Theory
Fall 2005, Dr. Shirley Liu

Homework 2

Due: Monday, October 10, in lecture

Note: You can always hand it in early, but no homeworks passed the due time will be accepted

1. [9] For each of the following preferences described below, give a valid utility function $U(x_1, x_2)$ that accurately represent the preference: *Remember: There are many different ways to represent a given preference, you just need to give one correct answer...*

   (a) [3] A consumer likes $x_1 =$ (butterfingers) and $x_2 =$ (Krustyburger). He is always willing to substitute 3 butterfingers for 1 Krustyburger.

   (b) [3] A consumer likes $x_1 =$ (coffee) and $x_2 =$ (cake). She always consume the two goods together at a fixed ratio such that for each cup of coffee, she must have $\frac{1}{3}$ of cake.

   (c) [3] A consumer consumes two goods (x_1, x_2) such that $MU_1 > 0$, and $MU_2 = 0$.

2. [28] Frank enjoys going to Starbucks and consuming $x_1 =$ (Lattes), and $x_2 =$ (scones). Frank has well-behaved preferences represented by the following utility function: $U(x_1, x_2) = 2x_1^{\frac{1}{2}} x_2^{\frac{1}{2}}$. Let the price of Lattes, scones, and Frank's income be (p_1, p_2, m), respectively.

   (a) [4] Given Frank's preferences, graphically illustrate his indifference curve that passes through the bundle $(4, 25)$. *Label all axis, and at least two bundles that are on this indifference curve.*

   (b) [4] Derive Frank's marginal utility for Lattes (MU_1); and derive Frank's marginal utility for scones (MU_2).

   (c) [4] Derive the expression for Frank's marginal rate of substitution between Lattes and scones (MRS). *Simplify your answer.*

   (d) [8] Calculate Frank's marginal rate of substitution if he consumes the bundle $(20, 5)$; calculate Frank's marginal rate of substitution if he consumes $(5, 20)$. Does Frank's preferences exhibit "Diminishing marginal rate of substitution? Explain.

   (e) [8] Derive Frank's demand function for Lattes $(x_1(p_1, p_2, m))$; and derive Frank's demand function for scones $(x_2(p_1, p_2, m))$.

3. [19] Oscar has perfect substitutes preferences for two goods: x_1 = (sandwiches) and x_2 = (hamburgers). He is always willing to substitute 1 sandwich for 3 hamburgers, therefore his preferences can be represented by $U(x_1, x_2) = 3x_1 + x_2$ Suppose the price for each sandwich is \$4 and the price for each hamburger is \$2. Oscar has an income of m = \$60.

   (a) [4] What is Oscar's marginal rate of substitution (MRS)?

   (b) [4] Does Oscar's preferences exhibit "Diminishing marginal rate of substitution"? Explain.

   (c) [3] What is Oscar's opportunity cost of consuming an extra hamburger?

   (d) [8] Given the prices and his income, how many sandwiches will Oscar choose to consume? How many hamburgers will Oscar choose to consume?

4. [44] Consider two consumers, Shirley and Denise. Both Shirley and Denise consumes two goods: x_1 = (beer) and x_2 = (cigarettes). Suppose the price of beer and cigarettes are p_1 = p_2 = \$1, and both Shirley and Denise have incomes of \$100. Let Shirley's preferences be represented by $U_S(x_1, x_2) = \text{Min}\{x_1, \frac{1}{4}x_2\}$; and Denise's preferences be represented by $U_D(x_1, x_2) = 5x_2$.

   (a) [3] What type of preferences does Shirley have?

   (b) [4] Graphically illustrate all the bundles Shirley prefers equally as the bundle $(5, 22)$. *Label all axis, and kinks (if any).*

   (c) [4] Is Shirley's preferences well-behaved? Explain. *You can use examples to explain your answer.*

   (d) [3] For Denise, beer is what type of good? i.e. "Regular" good, "bad", or a "neutral" good?

   (e) [10] Determine the level of utility each consumer gets by consuming the bundle $\overline{X} = (3, 3)$; determine the level of utility each consumer gets by consuming the bundle $\widehat{X} = (1, 4)$. Which bundle ($\overline{X}$ or $\widehat{X}$) does Shirley prefer? Which one does Denise prefer?

   (f) [4] If both Shirley and Denise consumes $\overline{X} = (3, 3)$, can you say which individual is better off? Explain.

   (g) [8] Given the prices and her income $(p_1, p_2, m) = (1, 1, 100)$, how many units of beer and cigarettes will Shirley choose to consume?

   (h) [8] Given the prices and her income $(p_1, p_2, m) = (1, 1, 100)$, how many units of beer and cigarettes will Denise choose to consume?