ECONOMICS 201
SPRING 2015

PROBLEM SET 2

1. Cookie Monster likes chocolate cookies (good 1) and sugar cookies (good 2). His demand functions are $X_1(P_1, P_2, m) = \frac{\alpha m}{P_1}$ and $X_2(P_1, P_2, m) = \frac{(1-\alpha)m}{P_2}$, where $\alpha = \frac{1}{3}$, $P_1 = 1$, and $P_2 = 2$.

   a. How many chocolate and sugar cookies does he consume if his income is 30?
   b. How many chocolate and sugar cookies does he consume if his income increases to 36?

2. Peter Griffin's demand function for good 1 is $X_1(P_1, P_2, m) = \frac{P_1^{-2} m}{P_1^{-1} + P_2^{-1}}$.

   a. Using a partial derivative, show whether good 1 is normal or inferior.
   b. Using a partial derivative, show whether goods 1 and 2 are complements or substitutes.

3. During hot summer afternoons, Ludacris drinks lemonade (good 1) and iced tea (good 2). His utility function is $u(X_1, X_2) = X_1^{\alpha} X_2^{1-\alpha}$, where $0 < \alpha < 1$.

   a. What is Ludacris' EMP (Expenditure Minimization Problem, i.e. minimize expenditures subject to achieving a certain level of utility $\bar{u}$)?
   b. What is the Lagrangian associated with the EMP? (Use μ as the Lagrange multiplier.)
   c. What are the first order conditions?
   d. Demonstrate that, like the UMP, the MRS equals the price ratio.
   e. Solve for his (compensated) demand for lemonade.
   f. How does his (compensated) demand for lemonade change when the price of lemonade rises?

4. Shakira's initial consumption bundle is (5,10). The price of good 1 decreases, and her new consumption bundle is (9,11). If we kept her initial level of utility constant, her consumption bundle at the new prices would have been (7,9).

   a. What is the magnitude of the uncompensated price effect (i.e. change in consumption of good 1 from the initial to the new consumption bundle)?
   b. What is the magnitude of the compensated price effect or substitution effect?
   c. What is the magnitude of the income effect? Is good 1 normal or inferior?

5. Do the following utility functions have the expected utility form?

   a. $U(c_1, c_2; \pi_1, \pi_2) = \pi_1^{0.5} c_1^{0.5} + \pi_2^{0.5} c_2^{0.5}$

b. $U(c_1, c_2; \pi_1, \pi_2) = \pi_1 c_1^{0.5} + \pi_2 c_2^{0.5}$

c. $U(c_1, c_2; \pi_1, \pi_2) = \pi_1 \pi_2 c_1^{0.5} c_2^{0.5}$

6. Katy Perry's Bernoulli utility function is $u(c) = c^{\frac{1}{3}}$. Graph this function with consumption (c) on the horizontal axis and utility (u) on the vertical axis. Is she risk averse or risk-loving? How can you tell from the graph?

7. Calculate the coefficient of absolute risk aversion for the following Bernoulli utility functions. Say whether preferences are risk averse, risk loving, or risk neutral.

   a. $u(c) = c^{0.5}$
   b. $u(c) = c^2$
   c. $u(c) = \ln(c)$

8. True or false? A consumer is risk loving if she prefers a lottery to the expected value of the lottery.

9. In the insurance example that we did in class, we found that the MRS equaled the price ratio. That is, $\frac{(1-\pi)u'(C_1)}{(\pi)u'(C_2)} = \frac{1-\pi}{\pi}$, where $C_1 = C_2 = \overline{C}$ is the full-insurance consumption level.

   a. If, for some reason, the consumer is overinsured (consumption in loss state is bigger than consumption in the no-loss state, $C_1 < C_2$), is the MRS bigger or smaller than the price ratio?
   b. If, for some reason, the consumer is underinsured (consumption in no-loss state is bigger than consumption in the loss state, $C_1 > C_2$), is the MRS bigger or smaller than the price ratio?