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Problem Set #6: General Equilibrium Theory

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1. If the utility for flounder x_1 and flour x_2 is $\log x_1 + \log x_2$, what is the demand function for flounder? By what approximately what percent does the demand for flounder change if the price rises by 10%? What happens to the demand for flour?
2. In each case explain why the function might or might not be a demand function, or pair of such functions:
 - a. $x_1 = \frac{mp_2}{p_1}$
 - b. $x_1 = x_2 = \frac{m}{p_1 + p_2}$
3. Suppose that Orca and Dorca are dolphins who like to consume herring x_1 and tuna x_2 . Both have get utility $x_1^{0.5} x_2^{0.5}$. Orca has one tuna and Dorca one herring. Draw a careful picture of the Edgeworth box, showing the endowment, the competitive equilibrium (and competitive equilibrium price line), the contract curve and the core.
4. Suppose that Orca and Dorca's utility is given by $u(x_1, x_2) = x_1^\alpha + x_2^\alpha$ where $\alpha > 0$. Orca has \bar{x}_1^1 herrings and no tuna; Dorca has \bar{x}_2^2 tunas and no herring.
 - a. Find Orca and Dorca's individual excess demand for tuna and herring.
 - b. Find competitive equilibrium prices as a function of $\alpha, \bar{x}_1^1, \bar{x}_2^2$. If good 1 is numeraire, what happens to the price of good 2 when \bar{x}_2^2 is increased?
5. In Lalaland, crystals are the only good. Three people live in Lalaland, Mr. Yuppie, Ms. Yuppie and a starving student. Mr. Yuppie's consumption of crystals is x_1 ; Ms. Yuppie's x_2 ; and the starving student's x_3 . Mr. Yuppie and Ms. Yuppie each have 14 crystals, while the student has only 8. Each person is not concerned about his or her own crystal consumption, but feels morally obligated to see that his or her fellows are adequately supplied with crystals. Mr. Yuppie gets utility $(x_1)^2 x_2 x_3$; Ms. Yuppie gets $x_1 (x_2)^2 x_3$ and the student $x_1 x_2 (x_3)^2$.
 - a. Show that neither Mr. nor Ms. Yuppie will donate a crystal to the student.
 - b. Show that everyone will be better off if both Mr. and Ms. Yuppie give a crystal to the starving student. What does this imply about the efficiency of the competitive equilibrium?
 - c. Suppose that Ms. Yuppie offers to match any donations of crystals made by Mr. Yuppie to the student. Will Mr. Yuppie donate a crystal? Why? Will Ms. Yuppie make the offer? Why?