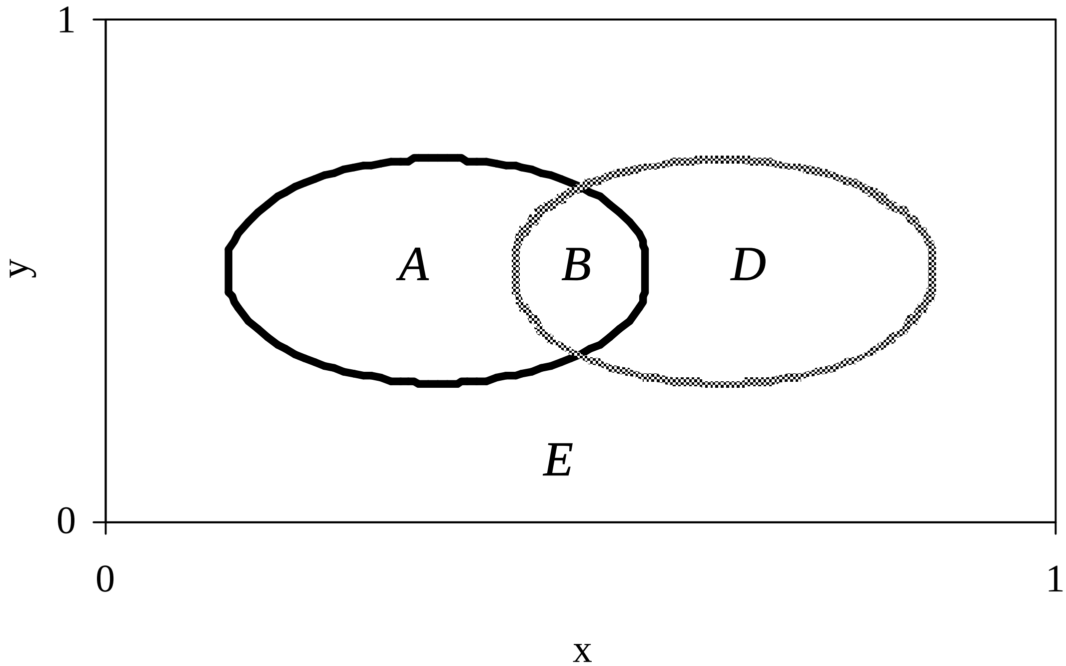
MICROECONOMIC ANALYSIS
ECON 8001-2
Fall 2008

Instructor: Terry Hurley Due: 9-15-09
TA: Giovann Alarcon

HOMEWORK #1

Note: When writing up your answers, carefully define all new notation and terms that you introduce, and write in complete sentences and paragraphs.

1. For $(x, y) \in [0, 1]\times[0, 1]$, consider the sets $\Omega = \{(x, y): (x - 0.35)^2 + (y - 0.5)^2 \leq 0.05\}$ and $\Theta = \{(x, y): (x - 0.65)^2 + (y - 0.5)^2 \leq 0.05\}$. These sets are illustrated on the figure below. Ω represents all points on and inside the darker circle and Θ represents all points on and inside the lighter circle. These sets and their intersection divide all the points in $x, y \in [0, 1]\times[0, 1]$ into four distinct regions labeled *A*, *B*, *D*, and *E* (being a little loose with the boundaries). Consider a point $(x', y') \in [0, 1]\times[0, 1]$.
   (a) If $(x', y') \in \Theta$ or $(x', y') \in \Omega$, in what region or regions is (x', y')?
   (b) If $(x', y') \in \Theta$ and $(x', y') \in \Omega$, in what region or regions is (x', y')?
   (c) If $(x', y') \in \Theta$ or not $(x', y') \in \Omega$, in what region or regions is (x', y')?
   (d) If not $(x', y') \in \Theta$ and $(x', y') \in \Omega$, in what region or regions is (x', y')?
   (e) If not $(x', y') \in \Theta$ or not $(x', y') \in \Omega$, in what region or regions is (x', y')?
   (f) If not $(x', y') \in \Theta$ and not $(x', y') \in \Omega$, in what region or regions is (x', y')?



2. Prove that for any rational preference relation $\succsim$ defined on the set of alternatives X
   (a) the indifference relation ~ is reflexive, transitive, and symmetric, (part of MWG 1.B.2);
   (b) for all $x, y, z \in X$, if $x \succ y$ and $y \sim z$, then $x \succ z$.

3. Consider the set of possible dessert alternatives X = {*cookies*, *cake*, *pie*, *pudding*} and the preference relation *cookies* ~ *cake*, *pie* $\succ$ *cake*, *pie* $\succ$ *pudding*, *cookies* $\succ$ *pudding*, *cake* $\succ$ *pudding*, and *pie* ~ *cookies*.
   (a) Show that this preference relation is not rational.
   (b) Define your own rational preference relation over these desserts.
   (c) Construct a utility function for the preference function you defined in part (b).
   (d) Can you construct an alternative to the utility function in part (c) for the preferences you defined in part (b)? If so, do it.
   (e) What are some of the economic implications for your answer in part (d)?

4. Define the choice set $\boldsymbol{B} = (\{x_1, x_2\}, \{x_1, x_3\}, \{x_2, x_3\}, \{x_1, x_2, x_4\})$ and define a rule

$$C(b) = \begin{cases} \{x_2\}, & for\ \{x_1, x_2\} \\ \{x_3\}, & for\ \{x_1, x_3\} \\ \{x_3\}, & for\ \{x_2, x_3\} \\ \{x_2, x_4\}, & for\ \{x_1, x_2, x_4\} \end{cases}.$$

   (a) Does this choice set and rule represent a valid choice structure? Justify your answer.
   (b) Is this choice rule consistent with the *Weak Axiom of Revealed Preferences*? Justify your answer.
   (c) Use this choice rule to define the set of revealed preference relations for the different sets of alternatives in $\boldsymbol{B}$. Taken together, is this revealed preference relation consistent with a rational preference relation defined $\{x_1, x_2, x_3, x_4\}$? Explain.