Economics 200C: Problem Set I

Due: April 19, 2010

1. A game has a unique Nash equilibrium in which players use nondegenerate mixed strategies (that is, their strategies place positive probability on more than one pure strategy). Can this game be dominance solvable?

2. (Philip's Theorem) Show that the game:

	Left	Right
Up	a, a	c, d
Down	d, c	b, b

   has a pure-strategy Nash equilibrium (no matter what the values of a, b, c, d.

3. Given a game $\Gamma(S)$ with strategy set $S = S_1 \times \cdots \times S_I$. If $T = T_1 \times \cdots \times T_I$ with $T_i \subset S_i$ for each i, then the restriction of $\Gamma(S)$ to T is the new game $\Gamma(T)$ with strategy set T, player set identical to that of $\Gamma(S)$ and payoff functions obtained by restricting the payoff functions. That is, if u_i^S in the payoff function in $\Gamma(S)$, then the payoff function of $\Gamma(T)$ is $u_i^T(t) \equiv u_i^S(t)$. A restriction to T is closed under best responses if for all i and all $t_{-i} \in T_{-i}$ the solutions to:

$$\max u_i(s_i, t_{-i}) \text{ subject to } s_i \in S_i$$

   are contained in T_i.

   (a) Show that if the restriction to T is closed under best responses, then any Nash equilibrium of $\Gamma(T)$ is a Nash Equilibrium of $\Gamma(S)$.

   (b) Show (by example) that if T is not closed under best responses, then there may exist a Nash equilibrium of $\Gamma(T)$ that is not a Nash equilibrium of $\Gamma(S)$.

   (c) Must a rationalizable strategy in $\Gamma(T)$ be rationalizable in $\Gamma(S)$? Prove or give a counter example. Would the answer change if T is closed under best responses?

4. MGW: 8.D2, 8.D.4, 8.D.6

5. Look at Problem Set I from 200C. No need to hand in solutions (problems and answer notes posted on last year's webpage).