Department of Economics
The Ohio State University
Econ 8817–Game Theory

Homework #1–Due Tuesday September 16

Directions: Answer all questions, and be neat. If you discuss the questions in study groups, list the members of your study group, and make sure that the writeup is your own work. Do not look at answer sheets from previous years' homeworks or the Osborne-Rubinstein solutions manual. Here is a hint for showing that there is no Nash equilibrium or that a given strategy profile is the unique Nash equilibrium: Show that for any "candidate" strategy profile, some player must have a profitable deviation. This approach is usually easier than constructing the best reply correspondence and showing there is no fixed point.

1. O-R, exercise 19.1.

2. O-R, exercise 28.1.

3. O-R, exercise 35.2.

4. Consider a first-price auction with two players and certain (non-random) values. The player with the highest bid wins the object and pays his/her bid. Letting v_i denote the object's value to player i and letting b_i denote player i's bid, the payoffs are

$$\begin{aligned} u_i &= v_i - b_i \text{ if } b_i > b_{-i} \\ u_i &= \frac{v_i - b_i}{2} \text{ if } b_i = b_{-i} \\ u_i &= 0 \text{ if } b_i < b_{-i}. \end{aligned}$$

(a) If we have $v_1 = 1$ and $v_2 = 2$, show that there are no pure strategy Nash equilibria.
(b) If we have $v_1 = 1$ and $v_2 = 2$, construct a Nash equilibrium in which at least one player uses a mixed strategy.

5. For the "chicken" game of Figure 47.1, find the correlated equilibrium for which the sum of the payoffs of the two players is the highest.