**Microeconomics II**

**Homework 7**

**Question 1.**

This is a famous game, known to game theorists as “The Battle of the Sexes.” The story goes like this. Two people, let us call them Michelle and Roger, although they greatly enjoy each other’s company, have very diﬀerent tastes in entertainment. Roger’s tastes run to ladies’ mud wrestling, while Michelle prefers Italian opera. They are planning their entertainment activities for next Saturday night. For each of them, there are two possible actions, go to the wrestling match or go to the opera. Roger would be happiest if both of them went to see mudwrestling. His second choice would be for both of them to go to the opera. Michelle would prefer if both went to the opera. Her second choice would be that they both went to see the mud wrestling. They both think that the worst outcome would be that they didn’t agree on where to go. If this happened, they would both stay home and sulk.

 **Battle of the Sexes**

 **Michelle**

**Roger** Wrestling Opera

|  |  |
| --- | --- |
| **(2,1)** | **(0,0)** |
| **(0,0)** | **(1,2)** |

Wrestling

Opera

(a) Is the sum of the payoﬀs to Michelle and Roger constant over all outcomes? Does this game have a dominant strategy equilibrium?

(b) Find two Nash equilibria in pure strategies for this game.

(c) Find a Nash equilibrium in mixed strategies.

**Question 2.**

This is another famous two-person game, known to game theorists as “Chicken.” Two teenagers in souped-up cars drive toward each other at great speed. The ﬁrst one to swerve out of the road is “chicken.” The best thing that can happen to you is that the other guy swerves and you don’t. Then you are the hero and the other guy is the chicken. If you both swerve, you are both chickens. If neither swerves, you both end up in the hospital. A payoﬀ matrix for a chicken-type game is the following.

 **Le Roy**

**Joe Bob** Swerve Don’t Swerve

|  |  |
| --- | --- |
| **(1,1)** | **(1,2)** |
| **(2,1)** | **(0,0)** |

Swerve

Don’t Swerve

1. Does this game have a dominant strategy?
2. What are the two Nash equilibria in pure strategies?
3. Find a Nash equilibrium in mixed strategies for this game.

**Question 3.**

Ned and Ruth love to play “Hide and Seek.” It is a simple game, but it continues to amuse. It goes like this. Ruth hides upstairs or downstairs. Ned can look upstairs or downstairs but not in both places. If he ﬁnds Ruth, Ned gets one scoop of ice cream and Ruth gets none. If he does not ﬁnd Ruth, Ruth gets one scoop of ice cream and Ned gets none. Fill in the payoﬀs in the matrix below.

 **Ruth**

**Ned** Upstairs Downstairs

|  |  |
| --- | --- |
| **(1,0)** | **(0,1)** |
| **(0,1)** | **(1,0)** |

Upstairs

Downstairs

1. Is this a zero-sum game?
2. What are the Nash equilibria in pure strategies?
3. Find a Nash equilibrium in mixed strategies for this game.