

**Econ 302**  
**Tutorial 6&7**

Note: Discuss question 1(b), 2(d), 2(e), 3(d) and 3(e) in Tutorial 7 and the others in Tutorial 6.

1. The game below is called the "Chicken game."
  - (a) Find the Nash equilibria in pure strategy.
  - (b) Find the Nash equilibria in mixed strategies.

|          |          |      |
|----------|----------|------|
|          | Straight | Turn |
| Straight | -2,-2    | 1,-1 |
| Turn     | -1,1     | 0,0  |

2. Consider a two-player game where player A chooses "Up," or "Down" and player B chooses "Left," "Center," or "Right". Their payoffs are as follows: When player A chooses "Up" and player B chooses "Left" player A gets \$5 while player B gets \$5. When player A chooses "Up" and player B chooses "Center" they get \$6 and \$1 correspondingly, while when player A chooses "Up" and player B chooses "Right" player A loses \$2 while player B gets \$4. Moreover, when player A chooses "Down" and player B chooses "Left" they get \$6 and \$1, while when player A chooses "Down" and player B chooses "Center" they both get \$1. Finally, when player A chooses "Down" and player B chooses "Right" player A loses \$1 and player B gets \$2. Assume that the players decide simultaneously (or, in general, when one makes his decision doesn't know what the other player has chosen).
  - (a) Draw the normal form game.
  - (b) Is there any dominant strategy for any of the players? Justify your answer.
  - (c) Is there any Nash equilibrium in pure strategies? Justify your answer fully and discuss your result.

A strategy is DOMINATED if there exists another strategy for the player that yields higher payoff, regardless of which strategy the other player chooses. Dominated strategies are assigned a probability of 0 in any Nash Equilibrium in mixed strategies. Given this observation answer the following parts of this problem:

- (d) Find the best response functions and the mixed strategies Nash Equilibrium if each player randomizes over his actions.
  - (e) Show graphically the best responses and the Nash Equilibria (in pure and in mixed strategies).
3. Consider a game where player A decides between his options, namely "Up", "Middle" and "Down" and Player B has to choose between "Left" or "Right." The payoff matrix is given by

|        | Left | Right |
|--------|------|-------|
| Upper  | 9,1  | 4,2   |
| Middle | 5,10 | 2,6   |
| Down   | 1,2  | 5,1   |

- (a) What is the best response of player A to each choice of player B?
- (b) What is the best response of player B to each choice of player A?
- (c) What is (are) the Nash Equilibrium (Equilibria) in pure strategies of this game? Fully explain your answer using the rule of "no unilateral deviation."
- (d) Consider the case where Player A decides first and Player B, observing the choice of Player A, follows. Draw the extensive form representation of this game.
- (e) What is the Backwards Induction Outcome of this game?