

# Game Theory with Applications

## Homework #1 – Due Thursday, September 29

1. Give an example of a business situation that can be modeled as a game. Find an article from a reputable journalistic source detailing a business situation. Identify the players involved, the set of actions, and a description of the payoffs. If you can identify the classic game to which the situation belongs (e.g., Ice Cream stand example, Prisoner's Dilemma, etc.), then make this argument. Predict the outcome of this game; if applicable, describe how the outcome would be different if there were multiple players acting strategically. Make sure to detail your reference for this article explicitly.

2. Consider the following game:

		Player 2	
		Z	W
Player 1	X	5, 5	-8, 8
	Y	-7, -8	0, 0

- (1) What is the Nash equilibrium?
  - (2) Justify your answer in (1).
  - (3) Change only one of the eight entries in the table such that there is no equilibrium.
3. Read the file, "Review of fixed point theorem.pdf," and answer the following questions.
    - (1) Find the fixed point of the function,  $f(x) = x^2 - 3x + 4$ .
    - (2) Does the function,  $f(x) = x + 1$ , have a fixed point? Why or why not?
    - (3) For each  $x \in \mathbf{R}$  define  $F(x) = (x, \infty) = \{y \in \mathbf{R} : y > x\}$ . Then  $F : \mathbf{R} \rightarrow \mathbf{R}$  is a correspondence. What is the correspondence,  $F(2)$ ?
    - (4) Let  $C$  be a correspondence defined on the closed interval  $[0, 1]$  that maps a point  $x$  to the closed interval  $[1-x/2, 1-x/4]$ . Draw all fixed points on the graph.