Worksheet 8 Name:_____
A&S100
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The Prisoner's Dilemma is an example of an alternate move game between two players; that is, both players make their moves at the same time without knowing what move the other player makes. According to http://www.miskatonic.org/pd.html, the Prisoner's Dilemma was first discovered by Melvin Drescher and Merrill Flood in 1950, but Albert W. Tucker wrote the first article about it. Here is the problem:

> *You and your partner in crime were just caught red-handed by the local police. The cops suspect, but cannot prove, that the two of you were involved in another crime that is under investigation. At the police station, the two of you are put in separate rooms and interrogated by the district attorney. You can do one of two things: remain silent about the second crime or confess to the second crime and thus implicate your partner in the second crime. If both of you remain silent, each of you will serve a 1-year prison term. If exactly one of you confesses to the second crime, the confessor will not do any time in jail, but the other will serve a 4-year prison term. If both of you confess, each of you will serve a 3-year prison term*

1. What are all possible outcomes of this game?

2. We now create a chart to represent all possible outcomes of the game. If person A confesses while person B remains silent, then person B must serve a 4-year prison term and person A will not do any time in jail. We represent this outcome by the ordered pair $(0, -4)$. Complete the following chart which represents all possible outcomes of the game.

		Person B	
		Remain Silent	Confess
Person A	Remain Silent		
	Confess	$(0, -4)$	

3. Your text defines an **equilibrium point** of a game to be a "pair of strategies such that neither player has any incentive to unilaterally change strategies."

   (a) Let's examine the pair of strategies in which A confesses and B remains silent which we identify with the point $(0, -4)$. We need to investigate what happens if exactly one of the criminals changes his or her strategy.

i. Would it benefit either criminal to unilaterally change strategy? If so, which criminal: A, B, or both?

ii. Since at least one player benefits from a unilateral change of strategy, the point $(0, -4)$ is not an equilibrium point.

(b) Consider the other three pairs of strategies: $(-4, 0)$, $(-1, -1)$, and $(-2, -2)$. Which, if any, of these points is an equilibrium point.