

UNIVERSITY OF CALIFORNIA, BERKELEY

DEPARTMENT OF STATISTICS

STAT-155: Game Theory

Fall 2013

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Assignment # 1

Date Given: September 9, 2013 (Monday)
Date Due: September 16, 2013 (Monday)

Total Points: 20

1. Consider a *subtraction game* with the following conditions

- The game starts with 31 chips on the board.
- There are two players, namely, Players I and II who alternate their moves.
- At each move a player can take exactly 1, 2, 4, 5 chips from the board.
- The game ends when all chips are removed from the board and last player removing the last few chips is the winner.

- (a) For the above game find the P and N positions.
- (b) Which player has a winning strategy?
- (c) Which player has a winning strategy, if we start the game with 347 chips?

2. Consider the same game as above starting with 31 chips except we change the end game by

The game ends when all chips are removed from the board and last player removing the last few chips loses the game.

For this *new version* of the game:

- (a) Find the P and N positions.
- (b) Which player has a winning strategy?
- (c) Which player has a winning strategy, if we start the game with 347 chips?

Remark: This new version is called the *misère rule*.