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CS 362

2 February 2019

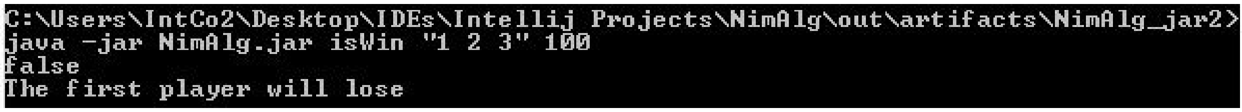
Homework 1

Readme:

The jar file can be run with the command “java -jar NimAlg.jar <setting> “moves” marbles”
Moves are to be in quotes and separated by spaces
For example a game of nim can be played with “java -jar NimAlg.jar play “1 2 3” 9” which will have 9 marbles and the set of moves being {1,2,3}
The settings are play(starts a game), period(shows information about the period), and isWin
Which tells if the player that goes first can win with the given set of moves and pile size
A number of marbles need not be specific when on the period setting

Part 1:

a. The isWin() function test cases
    i. Pile size = 100, Moves = {1,2,3}



```
C:\Users\IntCo2\Desktop\IDEs\Intellij Projects\NimAlg\out\artifacts\NimAlg_jar2>
java -jar NimAlg.jar isWin "1 2 3" 100
false
The first player will lose
```

    ii. Pile size = 1000, Moves = {1,4,5,10}

```
C:\Users\IntCo2\Desktop\IDEs\Intellij Projects\NimAlg\out\artifacts\NimAlg_jar2>
java -jar NimAlg.jar isWin "1 4 5 10" 1000
true
The first player will win
```

    iii. Pile size = 14000, Moves = {1,2,3,4,5,6}

```
C:\Users\IntCo2\Desktop\IDEs\Intellij Projects\NimAlg\out\artifacts\NimAlg_jar2>
java -jar NimAlg.jar isWin "1 2 3 4 5 6" 14000
false
The first player will lose
```

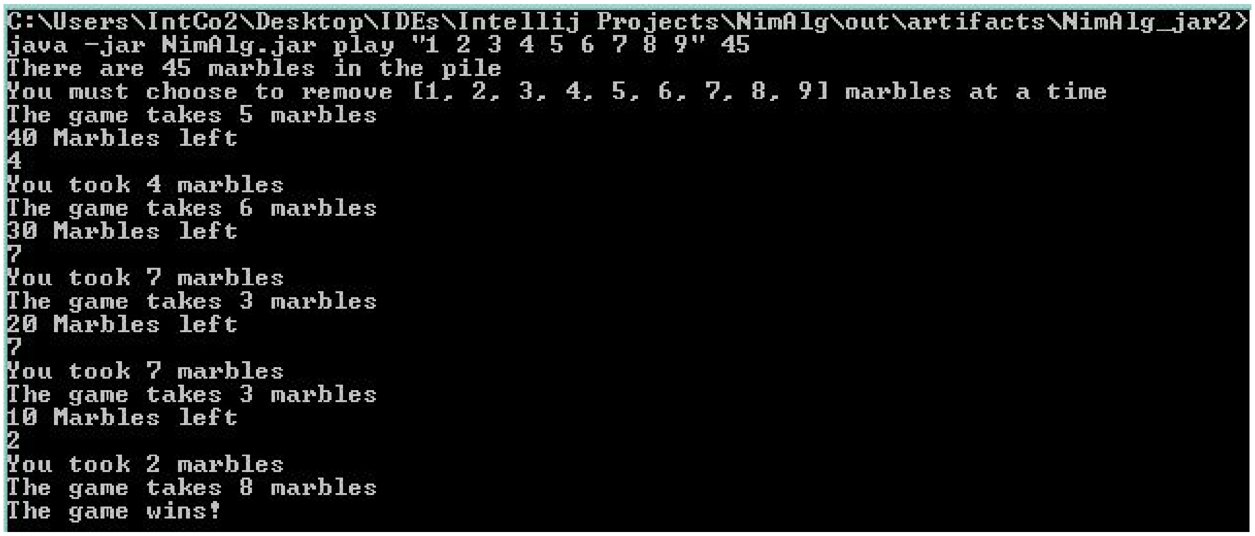
    iv. Pile size = 10000, Moves = {1, 64}

```
C:\Users\IntCo2\Desktop\IDEs\Intellij Projects\NimAlg\out\artifacts\NimAlg_jar2>
java -jar NimAlg.jar isWin "1 64" 10000
true
The first player will win
```

v. Pile size = 7500, Moves = {1,7,31,53,61}

```
C:\Users\IntCo2\Desktop\IDEs\Intellij Projects\NimAlg\out\artifacts\NimAlg_jar2>
java -jar NimAlg.jar isWin "1 7 31 53 61" 7500
false
The first player will lose
```

b. Playing Nim with Pile size = 45 and Moves = {1,2,3,4,5,6,7,8,9}

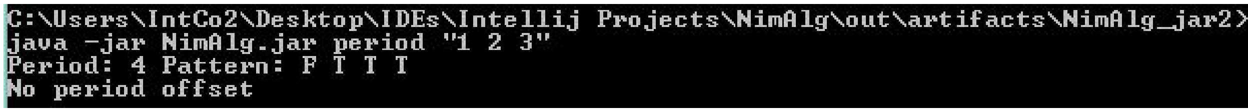


```
C:\Users\IntCo2\Desktop\IDEs\Intellij Projects\NimAlg\out\artifacts\NimAlg_jar2>
java -jar NimAlg.jar play "1 2 3 4 5 6 7 8 9" 45
There are 45 marbles in the pile
You must choose to remove [1, 2, 3, 4, 5, 6, 7, 8, 9] marbles at a time
The game takes 5 marbles
40 Marbles left
4
You took 4 marbles
The game takes 6 marbles
30 Marbles left
7
You took 7 marbles
The game takes 3 marbles
20 Marbles left
7
You took 7 marbles
The game takes 3 marbles
10 Marbles left
2
You took 2 marbles
The game takes 8 marbles
The game wins!
```

Part 2:

a. Periods and offset

i. Moves = {1,2,3}



```
C:\Users\IntCo2\Desktop\IDEs\Intellij Projects\NimAlg\out\artifacts\NimAlg_jar2>
java -jar NimAlg.jar period "1 2 3"
Period: 4 Pattern: F T T T
No period offset
```

ii. Moves = {1,4,5,10}

```
C:\Users\IntCo2\Desktop\IDEs\Intellij Projects\NimAlg\out\artifacts\NimAlg_jar2>
java -jar NimAlg.jar period "1 4 5 10"
Period: 3 Pattern: T T F
Offset: 6 repeats for N >= 6 Initial values: F T F T T T
```

iii. Moves = {1,2,4,5,7,8,9,10}

```
C:\Users\IntCo2\Desktop\IDEs\Intellij Projects\NimAlg\out\artifacts\NimAlg_jar2>
java -jar NimAlg.jar period "1 2 4 5 7 8 9 10"
Period: 17 Pattern: F T T F T T F T T T T T T T T T T
No period offset
```

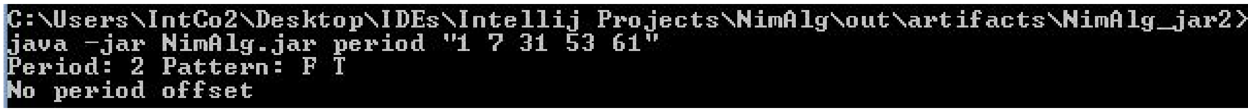
iv. Moves = {4,5}

```
C:\Users\IntCo2\Desktop\IDEs\Intellij Projects\NimAlg\out\artifacts\NimAlg_jar2>
java -jar NimAlg.jar period "4 5"
Period: 9 Pattern: F F F F T T T T T
No period offset
```

v. Moves = {1,64}

```
C:\Users\IntCo2\Desktop\IDEs\Intellij Projects\NimAlg\out\artifacts\NimAlg_jar2>
java -jar NimAlg.jar period "1 64"
Period: 65 Pattern: F T F T F T F T F T F T F T F T F T F T F T F T F T F T F T
F T F T F T F T F T F T F T F T F T F T F T F T F T F T F T F T F T T
No period offset
```

vi. Moves = {1,7,31,53,61}



```
C:\Users\IntCo2\Desktop\IDEs\Intellij Projects\NimAlg\out\artifacts\NimAlg_jar2>
java -jar NimAlg.jar period "1 7 31 53 61"
Period: 2 Pattern: F T
No period offset
```

b. The largest period I found was 92 with the set {31,53,61}

```
C:\Users\IntCo2\Desktop\IDEs\Intellij Projects\NimAlg\out\artifacts\NimAlg_jar2>
java -jar NimAlg.jar period "31 53 61"
Period: 92 Pattern: F F F F F F F F F F F F F F F F F F F F F F F F F F F F F F
F T T T T T T T T T T T T T T T T T T T T T T T T T T T T T T T T T T T T T T T
T T T T T T T T T T T T T T T T T T T T T T
No period offset
```