Programming Assignment 4: Alien Chess

CECS 328

1 Deadline

Friday, November 19th, 2021 at 5 PM

2 Alien Chess

On the planet Xeebo, chess is played with only one type of board piece. On a m by n board (where $4 \leq m \leq 7$ and n is large), one of the players first assigns a positive integer value to each square of the board. The other player then places pieces on the board so as to maximize the sum of the scores on the squares that it has chosen subject to one restriction: No piece can be placed on a square that is immediately vertical or horizontal to another piece. (Think of the pieces as one-square, non-attacking rooks.)

You are playing this game with a Xeebo and your goal is to write a program that can optimally determine the best place to put your pieces. You will return a list of the positions that you choose. (Board positions are $(row, column)$ and start counting from 0. Repeated positions will be counted incorrect.)

HINT: With the rows that small, it might be worth it to precompute, given a particular type of column placement in column i, all of the possible next column types that could be in column $i + 1$.

3 Your code

The Java header for your function in StudentSolver.java should be:

```
public static ArrayList<Pair<Integer,Integer>> solve(int[][] board)
```

The Python header for your function in studentsolver.py should be:

```
def solve(board)
```

The C++ header for your function in StudentSolver.h should be:

```
static std::vector<std::pair<int, int>> solve(int** board, int m, int
n);
```

4 Example

Consider the following 4×6 board:

$[[35, 90, 54, 62, 62, 69], [89, 17, 59, 13, 76, 24], [73, 1, 57, 11, 60, 34], [52, 94, 21, 67, 9, 77]]$

The optimal solution would be

$$[(0, 5), (3, 5), (1, 4), (0, 3), (3, 3), (1, 2), (0, 1), (3, 1), (1, 0)]$$

for a total of $69 + 77 + 76 + 62 + 67 + 59 + 90 + 94 + 89 = 683$.