Final project

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Objective

1. 使用最少筆畫，將一個 m*n 格子區域塗成指定顏色，而每一筆畫限制為由起點至終點連續且不重疊之一筆畫

Problem Definition

1. 給定一個 m*n 個格子矩陣，每個格子有一指定之顏色，可能為 0(黃色), 1(藍色), x(任意色)，右上為起點，左下為終點
2. 矩陣一開始是沒有顏色的，請產生一組筆畫使整個矩陣符合所指定的顏色，每一筆畫都是從起點開始，到終點結束，筆畫移動時只能往上下左右四個方向移動，而且不能穿過同一筆畫
3. 在最左邊的一整排與最上面的一整列可以任意是藍或黃
4. 比較晚塗的筆畫顏色可以附蓋過前面的顏色
5. 盡可能使用最少的筆畫數
6. 舉例在附件中

   想法是先考慮右下角開始，順序如下表

x	x	x	x	x	x
x	15	14	12	9	6
x	13	11	8	5	3
x	10	7	4	2	1

   原則上是從出發點先水平走到 x 軸，垂直走下去到那個位子後，再水平走到最左邊，最後再走到左下，假設顏色已符合規定則不在塗一次(例如: 順序 3 再塗第一筆時已經為黃色，可以跳過)，詳細每一步在附件中，此法為一個參考解，但不為最佳解

I/O Format

Your program must be able to read an input file. The I/O file names are arguments to your program; in other words, those file name can NOT be fixed. In command line, your program is invoked by:

```
./a.out  inputfile  outputfile
```

Input file example

```
6 4        //m*n
x x x x x x
x 0 1 1 0 1
x 1 0 0 0 0
x 0 0 1 1 0
```

在測資中，m、n 最高為 100，0 為黃色，1 為藍色，x 為任意色

output file example(format 必須換行，有空格的空一格)

4	3	2	1
8	7	6	5
12	11	10	9

```
5          //筆數
0 1 5 9 10 11 12        //第一筆的走法，第一個數字為哪個顏色，後面為走法，
                          中間一個空格
1 ...                   //第二筆
…
…
…                       //第五筆
```

Output format 必須遵守規定否則 0 分計算

Hint

假如附件中的 Heuristic 最後一筆走法(紅色):

	1	1	1	1	1
1	1				
1					
1					

可把原題目視為

x	x	x	x	x	x
x	x				
x					
x					

倒數第二筆也是以此類推，慢慢縮小 problem size

Program Submission

1. Please use C/C++ language and your program must be written in only one source file.
2. Your source file must be named as "Student_ID_number_FP.cpp" and please make sure that all characters of the filename are in **lower case**. For example, if your student number is 9711592, the name of your program file should be "9711592_FP.cpp".

Report

1. No more than 3 pages.
2. Your report must contain:
   a. The flow chart or the pseudo code of you program.
   b. The experimental results and analysis.
3. The report file name must be "Student_ID_number_FP.doc(x)" or "Student_ID_number_FP.pdf" and please make sure that all characters of the filename are in lower case. For example, if your student number is 9711592, the name of your program file should be "9711592_FP.doc" or "9711592_FP.pdf".

Grading

You need to submit both your source code and report. Remember the submission rules mentioned above, or you will be punished on your grades.

- Unique and compilable source code 40 %
- Performance(time&筆數) 40 %
- Report 20 %

遲交成績打 8 折

Due Date

Upload your report and program to the course website and there will be a **demo** of this assignment. All of your files must be archived to only one file named "**Student_ID_number_FP.zip**" or "**Student_ID_number_FP.rar**". You have also to handed in the report when demo.

The upload dead line would be **at pm 11:59 on January 19, 2017**. The demo schedule would be released before Jan. 19.