



# South African Computer Olympiad

## Final Round 2012

### Day 1



## Mining

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### Introduction

Fred the Manic Storekeeper has decided to enter the mining industry. He is eyeing a large plot of land which he believes holds great riches below the surface. However, he cannot decide precisely where to dig the mine.

### Task

Fred has partitioned the land into cells. For each cell, he has determined how much profit he can expect to make by mining at that position. Some cells are resource rich and so give a large profit, while others are mainly dirt and so would result in a net loss.

Given a grid representing the profits obtainable from mining each of the cells (in thousands of rands), determine the rectangular region that would yield the greatest total profit, were Fred to build his mine there.

**Implementation Note:** The `max` function in Python is very slow. If you are using Python and require this functionality, it may be necessary to implement the comparisons yourself to achieve top marks.

### Example

Suppose Fred provides us with the following grid.

1	1	-4
4	-1	3
-1	3	0

By choosing the lower 2x3 rectangle, Fred can achieve a profit of  $4 - 1 + 3 - 1 + 3 + 0 = 8$  or R8 000. This choice is the best possible.

### Input (stdin)

#### Sample input

```
3 3
1 1 -4
4 -1 3
-1 3 0
```

### Output (stdout)

#### Sample output

8

### Constraints

- $1 \leq N, M \leq 190$
- Each grid entry lies between  $-1\,500$  and  $1\,500$
- At least one entry will be positive.

Additionally, in 30% of the test cases:

- $N, M \leq 20$

And in 60% of the test cases:

- $N, M \leq 50$

### Time limit

0.5 seconds. (Python: 10 seconds)

### Scoring

A correct solution will score 100%, whereas an incorrect solution will score 0%.