

Exercise walk-through

Implementing 2D Array Algorithms ■ 4.13

eXercise

You must be able to

- sum, count, or search the elements of a **2D array** 二维数组
- find the maximum or minimum across a whole 2D array
- process a single **row** or a single **column**

Method — Summing a 2D array

Use nested loops and accumulate a total:

```
k+ktint+w nsum+w o+=w l+m+mi0p;
kfor+w p(k+ktint+w nr+w o+=w l+m+mi0p;+w nr+w o+w ngp.n+nalengthp;+w nro+o
+w      kfor+w p(k+ktint+w nc+w o+=w l+m+mi0p;+w nc+w o+w ngo[l+m+mi0o]p.n+n
+w          nsum+w o+o+=w ngo[nro]o[nco]p;
```

Method — One row or column

To process a single **row** r , loop over $g[r]$. To process a single **column** c , fix c and loop the **row** index.

Practice 2.1 ■ 1 mark

Describe how to sum every element of a 2D array.

Solution 2.1

Worked steps

use nested loops to add every element to a running total **B1**.

Practice 2.2 ■ 1 mark

State how to process a single row r of a 2D array g .

Solution 2.2

Method: One row or column

Worked steps

loop over the elements of $g[r]$ **B1**.

Practice 2.3 ■ 2 marks

For `int[][] g = {{1, 2}, {3, 4}};`, find the sum of all elements.

Solution 2.3

Worked steps

$$1 + 2 + 3 + 4 = 10 \quad \text{M1} \quad \text{A1}.$$

Exam-style 3.1 ■ 1 mark

To find the maximum across a whole 2D array, you

- A** sum all the elements
- B** track the largest value over all elements
- C** sort the rows
- D** count the elements

Solution 3.1

- A** sum all the elements
- B** track the largest value over all elements 
- C** sort the rows
- D** count the elements

Worked steps

B.

Exam-style 3.2 ■ 1 mark

To sum a single column, you fix the

- A** row index
- B** column index
- C** both indices
- D** neither index

Solution 3.2

Method: One row or column

- A row index
- B column index**
- C both indices
- D neither index



Worked steps

B.

Exam-style 3.3 ■ 1 mark

```
int[] [] g = {{2, 4}, {6, 8}};
```

- (a) State the sum of all elements.
- (b) State the sum of row 0.
- (c) State the sum of column 1.

Solution 3.3

Worked steps

(a) 20 **B1**. (b) $2 + 4 = 6$ **B1**. (c) $4 + 8 = 12$ **B1**.