

Problem 308: Range Sum Query 2D - Mutable

Problem Information

Difficulty: Medium

Acceptance Rate: 0.00%

Paid Only: No

Problem Description

Given a 2D matrix

matrix

, handle multiple queries of the following types:

Update

the value of a cell in

matrix

Calculate the

sum

of the elements of

matrix

inside the rectangle defined by its

upper left corner

(row1, col1)

and

lower right corner

(row2, col2)

Implement the NumMatrix class:

NumMatrix(int[][] matrix)

Initializes the object with the integer matrix

matrix

void update(int row, int col, int val)

Updates

the value of

matrix[row][col]

to be

val

int sumRegion(int row1, int col1, int row2, int col2)

Returns the

sum

of the elements of

matrix

inside the rectangle defined by its

upper left corner

(row1, col1)

and

lower right corner

(row2, col2)

.

Example 1:

3	0	1	4	2
5	6	3	2	1
1	2	0	1	5
4	1	0	1	7
1	0	3	0	5

→

3	0	1	4	2
5	6	3	2	1
1	2	0	1	5
4	1	2	1	7
1	0	3	0	5

Input

```
["NumMatrix", "sumRegion", "update", "sumRegion"] [[[3, 0, 1, 4, 2], [5, 6, 3, 2, 1], [1, 2, 0, 1, 5], [4, 1, 0, 1, 7], [1, 0, 3, 0, 5]], [2, 1, 4, 3], [3, 2, 2], [2, 1, 4, 3]]
```

Output

```
[null, 8, null, 10]
```

Explanation

```
NumMatrix numMatrix = new NumMatrix([[3, 0, 1, 4, 2], [5, 6, 3, 2, 1], [1, 2, 0, 1, 5], [4, 1, 0, 1, 7], [1, 0, 3, 0, 5]]); numMatrix.sumRegion(2, 1, 4, 3); // return 8 (i.e. sum of the left red rectangle) numMatrix.update(3, 2, 2); // matrix changes from left image to right image numMatrix.sumRegion(2, 1, 4, 3); // return 10 (i.e. sum of the right red rectangle)
```

Constraints:

$m == \text{matrix.length}$

$n == \text{matrix[i].length}$

$1 \leq m, n \leq 200$

$-1000 \leq \text{matrix}[i][j] \leq 1000$

$0 \leq \text{row} < m$

$0 \leq \text{col} < n$

$-1000 \leq \text{val} \leq 1000$

$0 \leq \text{row1} \leq \text{row2} < m$

$0 \leq \text{col1} \leq \text{col2} < n$

At most

5000

calls will be made to

sumRegion

and

update

Code Snippets

C++:

```
class NumMatrix {
public:
    NumMatrix(vector<vector<int>>& matrix) {

    }

    void update(int row, int col, int val) {

    }

    int sumRegion(int row1, int col1, int row2, int col2) {

    }
};
```

/**
 * Your NumMatrix object will be instantiated and called as such:
 * NumMatrix* obj = new NumMatrix(matrix);
 * obj->update(row,col,val);
 * int param_2 = obj->sumRegion(row1,col1,row2,col2);
 */

Java:

```
class NumMatrix {

    public NumMatrix(int[][] matrix) {

    }

    public void update(int row, int col, int val) {

    }

    public int sumRegion(int row1, int col1, int row2, int col2) {
```

```
}

}

/***
* Your NumMatrix object will be instantiated and called as such:
* NumMatrix obj = new NumMatrix(matrix);
* obj.update(row,col,val);
* int param_2 = obj.sumRegion(row1,col1,row2,col2);
*/

```

Python3:

```
class NumMatrix:

    def __init__(self, matrix: List[List[int]]):
        pass

    def update(self, row: int, col: int, val: int) -> None:
        pass

    def sumRegion(self, row1: int, col1: int, row2: int, col2: int) -> int:
        pass

# Your NumMatrix object will be instantiated and called as such:
# obj = NumMatrix(matrix)
# obj.update(row,col,val)
# param_2 = obj.sumRegion(row1,col1,row2,col2)
```

Python:

```
class NumMatrix(object):

    def __init__(self, matrix):
        """
        :type matrix: List[List[int]]
        """

    def update(self, row, col, val):
        """
```

```

:type row: int
:type col: int
:type val: int
:rtype: None
"""

def sumRegion(self, row1, col1, row2, col2):
"""
:type row1: int
:type col1: int
:type row2: int
:type col2: int
:rtype: int
"""

# Your NumMatrix object will be instantiated and called as such:
# obj = NumMatrix(matrix)
# obj.update(row,col,val)
# param_2 = obj.sumRegion(row1,col1,row2,col2)

```

JavaScript:

```

/**
 * @param {number[][]} matrix
 */
var NumMatrix = function(matrix) {

};

/**
 * @param {number} row
 * @param {number} col
 * @param {number} val
 * @return {void}
 */
NumMatrix.prototype.update = function(row, col, val) {

};

```

```

    /**
     * @param {number} row1
     * @param {number} col1
     * @param {number} row2
     * @param {number} col2
     * @return {number}
    */
NumMatrix.prototype.sumRegion = function(row1, col1, row2, col2) {

};

/**
 * Your NumMatrix object will be instantiated and called as such:
 * var obj = new NumMatrix(matrix)
 * obj.update(row,col,val)
 * var param_2 = obj.sumRegion(row1,col1,row2,col2)
 */

```

TypeScript:

```

class NumMatrix {
constructor(matrix: number[][][]) {

}

update(row: number, col: number, val: number): void {

}

sumRegion(row1: number, col1: number, row2: number, col2: number): number {

}
}

/**
 * Your NumMatrix object will be instantiated and called as such:
 * var obj = new NumMatrix(matrix)
 * obj.update(row,col,val)
 * var param_2 = obj.sumRegion(row1,col1,row2,col2)
 */

```

C#:

```
public class NumMatrix {  
  
    public NumMatrix(int[][][] matrix) {  
  
    }  
  
    public void Update(int row, int col, int val) {  
  
    }  
  
    public int SumRegion(int row1, int col1, int row2, int col2) {  
  
    }  
}  
  
/**  
 * Your NumMatrix object will be instantiated and called as such:  
 * NumMatrix obj = new NumMatrix(matrix);  
 * obj.Update(row,col,val);  
 * int param_2 = obj.SumRegion(row1,col1,row2,col2);  
 */
```

C:

```
typedef struct {  
  
} NumMatrix;  
  
NumMatrix* numMatrixCreate(int** matrix, int matrixSize, int* matrixColSize)  
{  
  
}  
  
void numMatrixUpdate(NumMatrix* obj, int row, int col, int val) {  
  
}
```

```

int numMatrixSumRegion(NumMatrix* obj, int row1, int col1, int row2, int
col2) {

}

void numMatrixFree(NumMatrix* obj) {

}

/**
* Your NumMatrix struct will be instantiated and called as such:
* NumMatrix* obj = numMatrixCreate(matrix, matrixSize, matrixColSize);
* numMatrixUpdate(obj, row, col, val);

* int param_2 = numMatrixSumRegion(obj, row1, col1, row2, col2);

* numMatrixFree(obj);
*/

```

Go:

```

type NumMatrix struct {

}

func Constructor(matrix [][]int) NumMatrix {

}

func (this *NumMatrix) Update(row int, col int, val int) {

}

func (this *NumMatrix) SumRegion(row1 int, col1 int, row2 int, col2 int) int
{
}

```

```
/**  
 * Your NumMatrix object will be instantiated and called as such:  
 * obj := Constructor(matrix);  
 * obj.Update(row,col,val);  
 * param_2 := obj.SumRegion(row1,col1,row2,col2);  
 */
```

Kotlin:

```
class NumMatrix(matrix: Array<IntArray>) {  
  
    fun update(row: Int, col: Int, `val`: Int) {  
  
    }  
  
    fun sumRegion(row1: Int, col1: Int, row2: Int, col2: Int): Int {  
  
    }  
  
}  
  
/**  
 * Your NumMatrix object will be instantiated and called as such:  
 * var obj = NumMatrix(matrix)  
 * obj.update(row,col,`val`)  
 * var param_2 = obj.sumRegion(row1,col1,row2,col2)  
 */
```

Swift:

```
class NumMatrix {  
  
    init(_ matrix: [[Int]]) {  
  
    }  
  
    func update(_ row: Int, _ col: Int, _ val: Int) {  
  
    }  
  
    func sumRegion(_ row1: Int, _ col1: Int, _ row2: Int, _ col2: Int) -> Int {  
}
```

```
}

}

/***
* Your NumMatrix object will be instantiated and called as such:
* let obj = NumMatrix(matrix)
* obj.update(row, col, val)
* let ret_2: Int = obj.sumRegion(row1, col1, row2, col2)
*/

```

Rust:

```
struct NumMatrix {

}

/***
* `&self` means the method takes an immutable reference.
* If you need a mutable reference, change it to `&mut self` instead.
*/
impl NumMatrix {

fn new(matrix: Vec<Vec<i32>>) -> Self {

}

fn update(&self, row: i32, col: i32, val: i32) {

}

fn sum_region(&self, row1: i32, col1: i32, row2: i32, col2: i32) -> i32 {

}

}

/***
* Your NumMatrix object will be instantiated and called as such:
* let obj = NumMatrix::new(matrix);
* obj.update(row, col, val);
* let ret_2: i32 = obj.sum_region(row1, col1, row2, col2);
*/

```

```
* /
```

Ruby:

```
class NumMatrix

=begin
:type matrix: Integer[][]

=end

def initialize(matrix)

end

=begin
:type row: Integer
:type col: Integer
:type val: Integer
:rtype: Void

=end

def update(row, col, val)

end

=begin
:type row1: Integer
:type col1: Integer
:type row2: Integer
:type col2: Integer
:rtype: Integer

=end

def sum_region(row1, col1, row2, col2)

end

end

# Your NumMatrix object will be instantiated and called as such:
# obj = NumMatrix.new(matrix)
# obj.update(row, col, val)
```

```
# param_2 = obj.sum_region(row1, col1, row2, col2)
```

PHP:

```
class NumMatrix {  
    /**  
     * @param Integer[][] $matrix  
     */  
    function __construct($matrix) {  
  
    }  
  
    /**  
     * @param Integer $row  
     * @param Integer $col  
     * @param Integer $val  
     * @return NULL  
     */  
    function update($row, $col, $val) {  
  
    }  
  
    /**  
     * @param Integer $row1  
     * @param Integer $col1  
     * @param Integer $row2  
     * @param Integer $col2  
     * @return Integer  
     */  
    function sumRegion($row1, $col1, $row2, $col2) {  
  
    }  
}  
  
/**  
 * Your NumMatrix object will be instantiated and called as such:  
 * $obj = NumMatrix($matrix);  
 * $obj->update($row, $col, $val);  
 * $ret_2 = $obj->sumRegion($row1, $col1, $row2, $col2);  
 */
```

Dart:

```
class NumMatrix {  
  
    NumMatrix(List<List<int>> matrix) {  
  
    }  
  
    void update(int row, int col, int val) {  
  
    }  
  
    int sumRegion(int row1, int col1, int row2, int col2) {  
  
    }  
}  
  
/**  
 * Your NumMatrix object will be instantiated and called as such:  
 * NumMatrix obj = NumMatrix(matrix);  
 * obj.update(row,col,val);  
 * int param2 = obj.sumRegion(row1,col1,row2,col2);  
 */
```

Scala:

```
class NumMatrix(_matrix: Array[Array[Int]]) {  
  
    def update(row: Int, col: Int, `val`: Int): Unit = {  
  
    }  
  
    def sumRegion(row1: Int, col1: Int, row2: Int, col2: Int): Int = {  
  
    }  
  
}  
  
/**  
 * Your NumMatrix object will be instantiated and called as such:  
 * val obj = new NumMatrix(matrix)  
 * obj.update(row,col,`val`)  
 * val param_2 = obj.sumRegion(row1,col1,row2,col2)
```

```
*/
```

Elixir:

```
defmodule NumMatrix do
  @spec init_(matrix :: [[integer]]) :: any
  def init_(matrix) do
    end

    @spec update(row :: integer, col :: integer, val :: integer) :: any
    def update(row, col, val) do
      end

      @spec sum_region(row1 :: integer, col1 :: integer, row2 :: integer, col2 :: integer) :: integer
      def sum_region(row1, col1, row2, col2) do
        end
        end

# Your functions will be called as such:
# NumMatrix.init_(matrix)
# NumMatrix.update(row, col, val)
# param_2 = NumMatrix.sum_region(row1, col1, row2, col2)

# NumMatrix.init_ will be called before every test case, in which you can do
some necessary initializations.
```

Erlang:

```
-spec num_matrix_init_(Matrix :: [[integer()]]) -> any().
num_matrix_init_(Matrix) ->
  .

-spec num_matrix_update(Row :: integer(), Col :: integer(), Val :: integer())
-> any().
num_matrix_update(Row, Col, Val) ->
  .

-spec num_matrix_sum_region(Row1 :: integer(), Col1 :: integer(), Row2 ::
```

```

integer(), Col2 :: integer()) -> integer().
num_matrix_sum_region(Row1, Col1, Row2, Col2) ->
.

%% Your functions will be called as such:
%% num_matrix_init_(Matrix),
%% num_matrix_update(Row, Col, Val),
%% Param_2 = num_matrix_sum_region(Row1, Col1, Row2, Col2),

%% num_matrix_init_ will be called before every test case, in which you can
do some necessary initializations.

```

Racket:

```

(define num-matrix%
  (class object%
    (super-new)

    ; matrix : (listof (listof exact-integer?))
    (init-field
      matrix)

    ; update : exact-integer? exact-integer? exact-integer? -> void?
    (define/public (update row col val)
    )

    ; sum-region : exact-integer? exact-integer? exact-integer? exact-integer? ->
    exact-integer?
    (define/public (sum-region row1 col1 row2 col2)
    )))

;; Your num-matrix% object will be instantiated and called as such:
;; (define obj (new num-matrix% [matrix matrix]))
;; (send obj update row col val)
;; (define param_2 (send obj sum-region row1 col1 row2 col2))

```

Solutions

C++ Solution:

```

/*
 * Problem: Range Sum Query 2D - Mutable
 * Difficulty: Medium
 * Tags: array, tree
 *
 * Approach: Use two pointers or sliding window technique
 * Time Complexity: O(n) or O(n log n)
 * Space Complexity: O(h) for recursion stack where h is height
 */

class NumMatrix {
public:
    NumMatrix(vector<vector<int>>& matrix) {

    }

    void update(int row, int col, int val) {

    }

    int sumRegion(int row1, int col1, int row2, int col2) {

    }
};

/***
 * Your NumMatrix object will be instantiated and called as such:
 * NumMatrix* obj = new NumMatrix(matrix);
 * obj->update(row,col,val);
 * int param_2 = obj->sumRegion(row1,col1,row2,col2);
 */

```

Java Solution:

```

/**
 * Problem: Range Sum Query 2D - Mutable
 * Difficulty: Medium
 * Tags: array, tree
 *
 * Approach: Use two pointers or sliding window technique
 * Time Complexity: O(n) or O(n log n)
 * Space Complexity: O(h) for recursion stack where h is height

```

```

/*
class NumMatrix {

public NumMatrix(int[][] matrix) {

}

public void update(int row, int col, int val) {

}

public int sumRegion(int row1, int col1, int row2, int col2) {

}

}

/**
 * Your NumMatrix object will be instantiated and called as such:
 * NumMatrix obj = new NumMatrix(matrix);
 * obj.update(row,col,val);
 * int param_2 = obj.sumRegion(row1,col1,row2,col2);
 */

```

Python3 Solution:

```

"""
Problem: Range Sum Query 2D - Mutable
Difficulty: Medium
Tags: array, tree

Approach: Use two pointers or sliding window technique
Time Complexity: O(n) or O(n log n)
Space Complexity: O(h) for recursion stack where h is height
"""


```

```

class NumMatrix:

def __init__(self, matrix: List[List[int]]):

```

```
def update(self, row: int, col: int, val: int) -> None:  
    # TODO: Implement optimized solution  
    pass
```

Python Solution:

```
class NumMatrix(object):  
  
    def __init__(self, matrix):  
        """  
        :type matrix: List[List[int]]  
        """  
  
  
    def update(self, row, col, val):  
        """  
        :type row: int  
        :type col: int  
        :type val: int  
        :rtype: None  
        """  
  
  
    def sumRegion(self, row1, col1, row2, col2):  
        """  
        :type row1: int  
        :type col1: int  
        :type row2: int  
        :type col2: int  
        :rtype: int  
        """  
  
  
    # Your NumMatrix object will be instantiated and called as such:  
    # obj = NumMatrix(matrix)  
    # obj.update(row,col,val)  
    # param_2 = obj.sumRegion(row1,col1,row2,col2)
```

JavaScript Solution:

```

    /**
 * Problem: Range Sum Query 2D - Mutable
 * Difficulty: Medium
 * Tags: array, tree
 *
 * Approach: Use two pointers or sliding window technique
 * Time Complexity: O(n) or O(n log n)
 * Space Complexity: O(h) for recursion stack where h is height
 */

/**
 * @param {number[][]} matrix
 */
var NumMatrix = function(matrix) {

};

/**
 * @param {number} row
 * @param {number} col
 * @param {number} val
 * @return {void}
 */
NumMatrix.prototype.update = function(row, col, val) {

};

/**
 * @param {number} row1
 * @param {number} col1
 * @param {number} row2
 * @param {number} col2
 * @return {number}
 */
NumMatrix.prototype.sumRegion = function(row1, col1, row2, col2) {

};

/**
 * Your NumMatrix object will be instantiated and called as such:
 * var obj = new NumMatrix(matrix)
 * obj.update(row,col,val)
 * var param_2 = obj.sumRegion(row1,col1,row2,col2)

```

```
 */
```

TypeScript Solution:

```
/**  
 * Problem: Range Sum Query 2D - Mutable  
 * Difficulty: Medium  
 * Tags: array, tree  
 *  
 * Approach: Use two pointers or sliding window technique  
 * Time Complexity: O(n) or O(n log n)  
 * Space Complexity: O(h) for recursion stack where h is height  
 */  
  
class NumMatrix {  
    constructor(matrix: number[][]){  
  
    }  
  
    update(row: number, col: number, val: number): void {  
  
    }  
  
    sumRegion(row1: number, col1: number, row2: number, col2: number): number {  
  
    }  
}  
  
/**  
 * Your NumMatrix object will be instantiated and called as such:  
 * var obj = new NumMatrix(matrix)  
 * obj.update(row,col,val)  
 * var param_2 = obj.sumRegion(row1,col1,row2,col2)  
 */
```

C# Solution:

```
/*  
 * Problem: Range Sum Query 2D - Mutable  
 * Difficulty: Medium  
 * Tags: array, tree
```

```

/*
 * Approach: Use two pointers or sliding window technique
 * Time Complexity: O(n) or O(n log n)
 * Space Complexity: O(h) for recursion stack where h is height
 */

public class NumMatrix {

    public NumMatrix(int[][] matrix) {

    }

    public void Update(int row, int col, int val) {

    }

    public int SumRegion(int row1, int col1, int row2, int col2) {

    }

}

/***
 * Your NumMatrix object will be instantiated and called as such:
 * NumMatrix obj = new NumMatrix(matrix);
 * obj.Update(row,col,val);
 * int param_2 = obj.SumRegion(row1,col1,row2,col2);
 */

```

C Solution:

```

/*
 * Problem: Range Sum Query 2D - Mutable
 * Difficulty: Medium
 * Tags: array, tree
 *
 * Approach: Use two pointers or sliding window technique
 * Time Complexity: O(n) or O(n log n)
 * Space Complexity: O(h) for recursion stack where h is height
 */

```

```

typedef struct {

} NumMatrix;

NumMatrix* numMatrixCreate(int** matrix, int matrixSize, int* matrixColSize)
{
}

void numMatrixUpdate(NumMatrix* obj, int row, int col, int val) {

}

int numMatrixSumRegion(NumMatrix* obj, int row1, int col1, int row2, int
col2) {

}

void numMatrixFree(NumMatrix* obj) {

}

/**
 * Your NumMatrix struct will be instantiated and called as such:
 * NumMatrix* obj = numMatrixCreate(matrix, matrixSize, matrixColSize);
 * numMatrixUpdate(obj, row, col, val);
 *
 * int param_2 = numMatrixSumRegion(obj, row1, col1, row2, col2);
 *
 * numMatrixFree(obj);
 */

```

Go Solution:

```

// Problem: Range Sum Query 2D - Mutable
// Difficulty: Medium
// Tags: array, tree
//

```

```

// Approach: Use two pointers or sliding window technique
// Time Complexity: O(n) or O(n log n)
// Space Complexity: O(h) for recursion stack where h is height

type NumMatrix struct {

}

func Constructor(matrix [][]int) NumMatrix {

}

func (this *NumMatrix) Update(row int, col int, val int) {

}

func (this *NumMatrix) SumRegion(row1 int, col1 int, row2 int, col2 int) int
{

}

/**
 * Your NumMatrix object will be instantiated and called as such:
 * obj := Constructor(matrix);
 * obj.Update(row,col,val);
 * param_2 := obj.SumRegion(row1,col1,row2,col2);
 */

```

Kotlin Solution:

```

class NumMatrix(matrix: Array<IntArray>) {

    fun update(row: Int, col: Int, `val`: Int) {

    }

    fun sumRegion(row1: Int, col1: Int, row2: Int, col2: Int): Int {

```

```

}

}

/***
* Your NumMatrix object will be instantiated and called as such:
* var obj = NumMatrix(matrix)
* obj.update(row,col,`val`)
* var param_2 = obj.sumRegion(row1,col1,row2,col2)
*/

```

Swift Solution:

```

class NumMatrix {

    init(_ matrix: [[Int]]) {
        self.matrix = matrix
    }

    func update(_ row: Int, _ col: Int, _ val: Int) {
        let currentVal = matrix[row][col]
        matrix[row][col] = val
        let diff = val - currentVal
        for r in row+1..

```

Rust Solution:

```

// Problem: Range Sum Query 2D - Mutable
// Difficulty: Medium

```

```

// Tags: array, tree
//
// Approach: Use two pointers or sliding window technique
// Time Complexity: O(n) or O(n log n)
// Space Complexity: O(h) for recursion stack where h is height

struct NumMatrix {

}

/**
* `&self` means the method takes an immutable reference.
* If you need a mutable reference, change it to `&mut self` instead.
*/
impl NumMatrix {

fn new(matrix: Vec<Vec<i32>>) -> Self {
}

fn update(&self, row: i32, col: i32, val: i32) {
}

fn sum_region(&self, row1: i32, col1: i32, row2: i32, col2: i32) -> i32 {
}

}

/** 
* Your NumMatrix object will be instantiated and called as such:
* let obj = NumMatrix::new(matrix);
* obj.update(row, col, val);
* let ret_2: i32 = obj.sum_region(row1, col1, row2, col2);
*/
}

```

Ruby Solution:

```
class NumMatrix
```

```

=begin
:type matrix: Integer[ ][ ]
=end
def initialize(matrix)

end

=begin
:type row: Integer
:type col: Integer
:type val: Integer
:rtype: Void
=end
def update(row, col, val)

end

=begin
:type row1: Integer
:type col1: Integer
:type row2: Integer
:type col2: Integer
:rtype: Integer
=end
def sum_region(row1, col1, row2, col2)

end

end

# Your NumMatrix object will be instantiated and called as such:
# obj = NumMatrix.new(matrix)
# obj.update(row, col, val)
# param_2 = obj.sum_region(row1, col1, row2, col2)

```

PHP Solution:

```

class NumMatrix {
    /**
     * @param Integer[][] $matrix
     */
    function __construct($matrix) {

    }

    /**
     * @param Integer $row
     * @param Integer $col
     * @param Integer $val
     * @return NULL
     */
    function update($row, $col, $val) {

    }

    /**
     * @param Integer $row1
     * @param Integer $col1
     * @param Integer $row2
     * @param Integer $col2
     * @return Integer
     */
    function sumRegion($row1, $col1, $row2, $col2) {
        }
    }

    /**
     * Your NumMatrix object will be instantiated and called as such:
     * $obj = NumMatrix($matrix);
     * $obj->update($row, $col, $val);
     * $ret_2 = $obj->sumRegion($row1, $col1, $row2, $col2);
     */
}

```

Dart Solution:

```

class NumMatrix {
    NumMatrix(List<List<int>> matrix) {

```

```

}

void update(int row, int col, int val) {

}

int sumRegion(int row1, int col1, int row2, int col2) {

}

/**
 * Your NumMatrix object will be instantiated and called as such:
 * NumMatrix obj = NumMatrix(matrix);
 * obj.update(row,col,val);
 * int param2 = obj.sumRegion(row1,col1,row2,col2);
 */

```

Scala Solution:

```

class NumMatrix(_matrix: Array[Array[Int]]) {

    def update(row: Int, col: Int, `val`: Int): Unit = {

    }

    def sumRegion(row1: Int, col1: Int, row2: Int, col2: Int): Int = {

    }

}

/**
 * Your NumMatrix object will be instantiated and called as such:
 * val obj = new NumMatrix(matrix)
 * obj.update(row,col,`val`)
 * val param_2 = obj.sumRegion(row1,col1,row2,col2)
 */

```

Elixir Solution:

```

defmodule NumMatrix do
  @spec init_(matrix :: [[integer]]) :: any
  def init_(matrix) do
    end

    @spec update(row :: integer, col :: integer, val :: integer) :: any
    def update(row, col, val) do
      end

      @spec sum_region(row1 :: integer, col1 :: integer, row2 :: integer, col2 :: integer) :: integer
      def sum_region(row1, col1, row2, col2) do
        end
      end

      # Your functions will be called as such:
      # NumMatrix.init_(matrix)
      # NumMatrix.update(row, col, val)
      # param_2 = NumMatrix.sum_region(row1, col1, row2, col2)

      # NumMatrix.init_ will be called before every test case, in which you can do
      some necessary initializations.

```

Erlang Solution:

```

-spec num_matrix_init_(Matrix :: [[integer()]]) -> any().
num_matrix_init_(Matrix) ->
  .

-spec num_matrix_update(Row :: integer(), Col :: integer(), Val :: integer()) -> any().
num_matrix_update(Row, Col, Val) ->
  .

-spec num_matrix_sum_region(Row1 :: integer(), Col1 :: integer(), Row2 :: integer(), Col2 :: integer()) -> integer().
num_matrix_sum_region(Row1, Col1, Row2, Col2) ->
  .

```

```

%% Your functions will be called as such:
%% num_matrix_init_(Matrix),
%% num_matrix_update(Row, Col, Val),
%% Param_2 = num_matrix_sum_region(Row1, Col1, Row2, Col2),

%% num_matrix_init_ will be called before every test case, in which you can
do some necessary initializations.

```

Racket Solution:

```

(define num-matrix%
  (class object%
    (super-new)

    ; matrix : (listof (listof exact-integer?))
    (init-field
      matrix)

    ; update : exact-integer? exact-integer? exact-integer? -> void?
    (define/public (update row col val)
      )
    ; sum-region : exact-integer? exact-integer? exact-integer? exact-integer? ->
    exact-integer?
    (define/public (sum-region row1 col1 row2 col2)
      )))

;; Your num-matrix% object will be instantiated and called as such:
;; (define obj (new num-matrix% [matrix matrix]))
;; (send obj update row col val)
;; (define param_2 (send obj sum-region row1 col1 row2 col2))

```