Questions of ITP course at Shahid-Beheshti-University

Part 7

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Sum of matrices

Write a program that calculates the sum of two matrices of the same order.

The memory management of the matrices in this program must be dynamic, so pay attention to allocating and freeing the memory.

Entrance

In the first line, r and ccc are written, which indicate the number of rows and columns of the matrices, respectively. Then in r of the next line, in each line ccc, a number is written, which represents the jth number in the ith line of the element ai, aj in the first matrix. The same process is repeated for the second matrix.

$$1 \le r, c \le 50$$

$$-100 \le a_{i,j} , b_{i,j} \le 100$$

Output

Print the matrix A+B A + B A+B to standard output according to the examples.

determinant

Write a program that calculates the determinant of a square matrix.

You must calculate the determinants recursively. If you need to create new matrices, you should manage their memory dynamically.

Hint: Use the expansion method.

Entrance

n or the number of rows and columns of the square matrix is written in the first line. Then in the next line n, a number is written in each line n, which represents the jth number in the ith line of the element ai, aj of the matrix.

$$1 \leq n \leq 10$$

$$-10 \leq a_{i,j} \leq 10$$

Output

On one line of standard output, print the determinant of the received matrix.

Queue

You must have stood in different queues, including the queue on the day of registration.....

Queues generally have the following three characteristics:

- The new person is added to the end of the queue.
- People leave from the beginning of the queue.
- There is no limit to the length of the queue.

Write a program that manages data in the form of English lowercase letters in a queue with the following commands:

1. The enqueue command adds a value to the end of the queue.
2. dequeue command: Removes and prints the first element of the queue. If the queue is empty, empty is printed.
3. print command: prints the elements of the queue in order from beginning to end. If the queue is empty, empty will be printed.
4. size command: prints the length of the queue.

In your program, you must implement and use the following functions:

```
void enqueue(char* &queue, int &n, char data);
```

```
char dequeue(char* &queue, int &n);
```

```
void print_queue(char* queue, int n);
```

Pay attention to the following points:

- The use of global variables is not allowed.
- Call by reference to pointer is used in the functions that need to change the address pointed to by the pointer. You can read more about this if needed.

Entrance

On each line of standard input, commands are entered according to the table below until the value F is entered.

Function	Input
enqueue	E
dequeue	D
dequeue	S
print	P

Output

For each command except E, print the appropriate expression on each line of standard output for that command.