10 Finding Jewels

10.1 Using Constants

To use Boolean constants with the type `bool`, `<stdbool.h>` should be included. Once it is included, you may use true and false as Boolean constants. Similarly, some constants for the system-defined limits of the built-in types are defined in `<limits.h>`. The following code shows how to use them:

```c
#include <stdio.h>
#include <limits.h>
#include <stdlib.h>
#include <stdbool.h>

bool is_less(int a, int b) {
    return a < b;
}

int main()
{
    int min = INT_MAX;
    int n[] = {5, -2, 7, -5, -10, 25, 12}, sz = sizeof n/sizeof *n;

    for (int i = 0; i < sz; ++i)
        if (is_less(abs(n[i]), min) == true)
            min = abs(n[i]);
    printf("min. dist: %d\n", min);

    return 0;
}
```

The constants `INT_MAX` and `INT_MIN` are useful for finding the minimum and the maximum element in a set of `int` values.

10.2 Programming Lab 10: jewels.c

You are on a treasure island and to find jewels on the island. Fortunately, you have a rectangular map of the island. The locations of the jewels are marked by positive integers and the empty slots are marked by zeros. Your current location is marked by -1.

Given the map, find the distance to the nearest jewels from you. The distance is measured by Manhattan distance, i.e. the sum of the differences of each coordinate. For your location (x_0, y_0), the distance to the jewels in (x_1, y_1) is calculated as $|x_0 - x_1| + |y_0 - y_1|$.

Given the following map, for example,

```
 0  0  1  0  0
 3  0  0 -1  0
 0  0  2  0  0
 4  0  5  0  0
```

the minimum distance to the nearest jewels is two, either to 1 or to 2.

Your program is to read from standard input. The first line of the input contains n and m $(0 < m, n < 100)$ denoting the number of rows and the number of columns of the map. Following n lines, each line contains m integers separated by a space. The integer value 0 denotes the empty locations, a positive integer denotes a jewel, and -1 denotes your location. Your program should print the Manhattan distance from your location to the nearest jewels on the map. The maximum number of jewels is $\max\{m, n\}$. If your location is not marked on the map, just print 0.

Additional requirements for bonus points

- Define and use the type `Coord` containing two `int` fields denoting the coordinates of the location.
- Define and use the functions for finding the locations of jewels and for finding your locations from the map. The map, a two-dimensional array, should be passed as a parameter to these functions.

Input	**Output**
4 5 0 0 1 0 0 3 0 0 -1 0 0 0 2 0 0 4 0 5 0 0	2
2 3 0 1 0 2 4 0	0