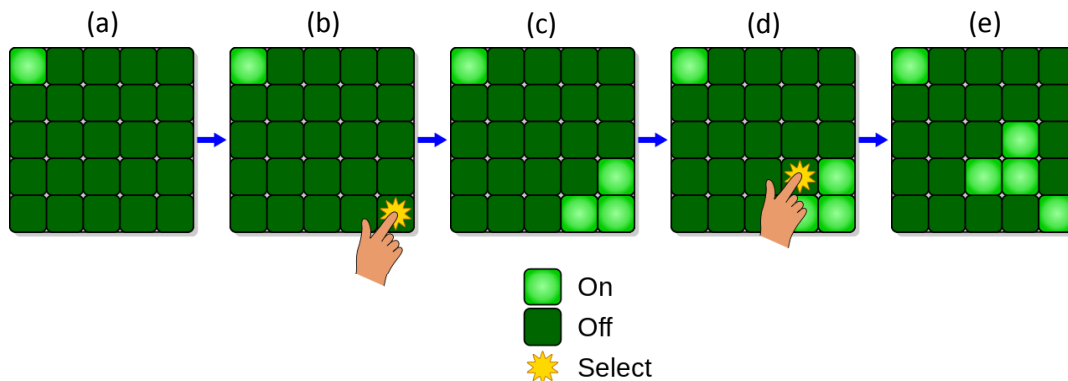


Exercise 1: Lights Out!

[50 marks]

Problem Statement

Lights Out is an electronic game released by Tiger Electronics in 1995. The game consists of a 5x5 grid of panels. When the game starts, some of the panels are lighted. Pressing a panel will toggle it and the adjacent panels. The goal of the game is to switch all the panels off by pressing some of them in sequence.



In this exercise, you are to write a program to simulate a sequence of panel presses on a given grid and determine the final state of the grid.

For example, if the initial state of the grid is as shown in (a) in the sample diagrams above (i.e., only the panel at the upper-left corner is lighted), after pressing two panels as shown in (b) and (d), the final state of the grid is as shown in (e) (i.e., a total of 5 panels are lighted).

Your program should read in a 5x5 grid of numbers representing the initial state of the grid. The numbers in this input are either 0 (not lighted) or 1 (lighted). For example, the grid shown in (a) is represented as follows:

Panels 0~4	1	0	0	0	0
Panels 5~9	0	0	0	0	0
Panels 10~14	0	0	0	0	0
Panels 15~19	0	0	0	0	0
Panels 20~24	0	0	0	0	0

Your program should also read in the length of the sequence of panels to be pressed, as well as the sequence itself.

The length of the sequence is an integer between 1 and 30 (i.e., there is at least 1 and at most 30 panels in the sequence).

The actual sequence is a sequence of integers between 0 and 24, each corresponding to a particular panel to be pressed. For example, 0~4 correspond to the five panels (from left to right) in the top row of the grid, while 20~24 correspond to the five panels in the bottom row. In the sample diagrams, the panel pressed in (b) is 24, whereas the one pressed in (d) is 18.

Your program should follow the sequence of presses to determine the final state of the grid after all the presses. For example, the final state for the example shown in the sample diagrams is as follows:

1	0	0	0	0
0	0	0	0	0
0	0	0	1	0
0	0	1	1	0
0	0	0	0	1

Write on the skeleton file **panel.c** given to you. You must include the following two functions in your program:

- **press()**
which takes in the grid, the length of the sequence, and the actual sequence. It follows the sequence of presses and updates the grid accordingly.
- **allOff()**
which takes in the grid, and returns 1 if all the panels are not lighted. Otherwise, it returns 0, as well as the number of panels which are lighted.

You are to determine the appropriate return types and parameters for these two functions. You may define additional functions as needed. Check sample runs for input and output format.

Sample Runs

Five sample runs are shown below with user input highlighted in **bold**.

Set #1:

```
Enter grid:
0 0 0 0 0
0 0 0 0 0
0 0 0 0 0
0 0 0 0 0
0 0 0 0 0
0 0 0 0 0
Enter length of sequence: 1
Enter sequence of panels: 12
Number of lighted panels: 5
0 0 0 0 0
0 0 1 0 0
0 1 1 1 0
0 0 1 0 0
0 0 0 0 0
```

Set #2:

```
Enter grid:
1 1 1 1 1
1 1 1 1 1
1 1 1 1 1
1 1 1 1 1
1 1 1 1 1
1 1 1 1 1
Enter length of sequence: 1
Enter sequence of panels: 12
Number of lighted panels: 20
1 1 1 1 1
1 1 0 1 1
1 0 0 0 1
1 1 0 1 1
1 1 1 1 1
```

Set #3:

```
Enter grid:
0 0 0 0 0
0 0 1 0 0
0 1 1 1 0
0 0 1 0 0
0 0 0 0 0
Enter length of sequence: 1
Enter sequence of panels: 12
All panels are off.
```

Set #4:

```
Enter grid:
1 1 0 0 0
1 0 0 0 0
0 0 0 0 0
0 0 0 0 0
0 0 0 0 0
Enter length of sequence: 1
Enter sequence of panels: 0
All panels are off.
```

Set #5:

```
Enter grid:
1 0 0 0 0
0 1 1 0 0
0 1 0 0 0
0 0 0 0 0
0 0 0 0 0
Enter length of sequence: 2
Enter sequence of panels: 6 0
All panels are off.
```