Indian Institute of Technology, Kharagpur

CS19001 Programming and Data Structures Laboratory
Section 1, Spring 2020

Assignment for Week 5 (February 26, 2020)

Total Marks: 40   **Submission Deadline:** 17:50

INSTRUCTIONS

1. Submit a separate C file for each problem. Name the solution for problem i as `week5-probi.c`. There are **separate submission links** for the 4 problems in Moodle.
2. You are allowed to consult notes, lectures slides and books.
3. Evaluation will be based on the following criteria: correctness, handling corner cases and programming style.

PROBLEMS

1. Consider the following code.

```c
#include <stdio.h>
#define MAX_SIZE 25

int main(){
  int size, i, j;
  int array[MAX_SIZE][MAXSIZE];
  printf("Enter the size (<= %d) of the square matrix: ", MAX_SIZE);
  scanf("%d", &size);
  if(size < 1 || size > MAX_SIZE){
    printf("Invalid input.\n");
    return 1;
  }

  // fill array according to the given choice (a,b or c)

  for(i=0; i<size; i++){
    for(j=0; j<size; j++){
      printf("%5d ", array[i][j]);
    }
    printf("\n");
  }
  return 0;
}
```

Your task is to replace the commented line with code that fills `array[][]` with entries that match the desired output. For example, if the desired output is of the form

```
 1   2   3   4   5
 6   7   8   9  10
11  12  13  14  15
16  17  18  19  20
21  22  23  24  25
```

for `size = 5`, then the code replacing the second commented line will be

```
for(i=0; i<size; i++){
  for(j=0; j<size; j++){
    a[i][j] = i*size + j + 1;
  }
}
```

Write code for generating the following patterns.

(a)						(b)						(c)				
1	6	11	16	21		1	2	3	4	5		1	2	3	4	5
2	7	12	17	22		10	6	7	8	9		16	17	18	19	6
3	8	13	18	23		14	15	11	12	13		15	24	25	20	7
4	9	14	19	24		18	19	20	16	17		14	23	22	21	8
5	10	15	20	25		22	23	24	25	21		13	12	11	10	9

| Marks: 4 | Marks: 8 | Marks: 8 |

Note that the user enters `size`. Your code should work for any size $\leq$ 25 (not just 5). Submit a single C file. You may ask the user to enter a choice (a,b,c) to choose the pattern.

2. Write a program that reads the name of a person and prints it using *initials* for everything except the last name/surname. You may assume that each test case is atmost 1000 characters long and contains only uppercase, lowercase letters and spaces.   Marks: 10

> **Example**
>
> ```
> Enter name: Kodandera Madappa Cariappa
> After conversion: K. C. Cariappa
> ```

3. Write a program that takes as input a line (set of words separated by spaces) and prints the individual words, one per line, in a rectangular frame of '*' symbols. You may assume that each test case contains at most 1000 characters and each word in the the test case has atmost 25 characters.   Marks: 10

Example

```
Input line/set of strings: The Child is father of the Man

**********
* The    *
* Child  *
* is     *
* father *
* of     *
* the    *
* Man    *
**********
```