Lab 7

Q.1 Write a program using nested for loops that generate a pattern of numbers and #s as shown in the output.

```c
#include <stdio.h>
int main()
{
  int n, row, col;
  printf("enter a number between 1 and 9:");
  scanf("%d", &n);
  for (row = 1; row <= n; row++)
  {
      for (col = 1; col <= n; col++)
          if (row >= col)
              printf ("%d", col);
          else
              printf ("#");
      printf ("\n");
  }
  return 0;
}
```

```
enter a number between 1 and 9:6
1#####
12####
123###
1234##
12345#
123456
```

Q.2 Write a program using nested for loops that generate a pattern as shown in the output of the below program.

```c
#include <stdio.h>
int main()
{
    int x = 0,y = 0;
    unsigned int rows = 0;
    printf("Enter the number of rows = ");
    scanf("%u",&rows);
    for(x=1; x<=rows; ++x)
    {
        // Print spaces
        for(y=x; y<=rows; ++y)
        {
            printf(" ");
        }
        // Print star/
        for(y =1; y<=((2*x)-1); ++y)
        {
            printf("*");
        }
        // Print new line
        for(y=x; y<=2*rows-x; ++y)
        {
            printf(" ");
        }
            // Print star/
        for(y =1; y<=((2*x)-1); ++y)
        {
            printf("*");
        }
        printf("\n");
    }
    return 0;
}
```

```
Enter the number of rows = 6
       *             *
      ***           ***
     *****         *****
    *******       *******
   *********     *********
  ***********   ***********
```

Q.3 Demonstrates the entering, reading and processing array elements. Find the average of array elements.

main.c

```c
#include<stdio.h>
void main()
{
    int i;
    float marks[5]; // array declaration
    float sum = 0, avg;
    for(i=0;i<=4;i++)
    {
        printf("\n Enter marks[%d]  =", i);
        scanf("%f",&marks[i]); // Entering array elements
    }
    for(i=0;i<=4;i++)
    {
        sum=sum+marks[i]; //Reading data from array
    }
    avg = sum/5;
     printf("\n Average marks = %6.2f", avg);
}
```

input

```
Enter marks[4]  =92

Average marks =  68.40

...Program finished with exit code 0
Press ENTER to exit console.
```

Q.4 Write a program in C to find out the second largest element of a given list of integers .

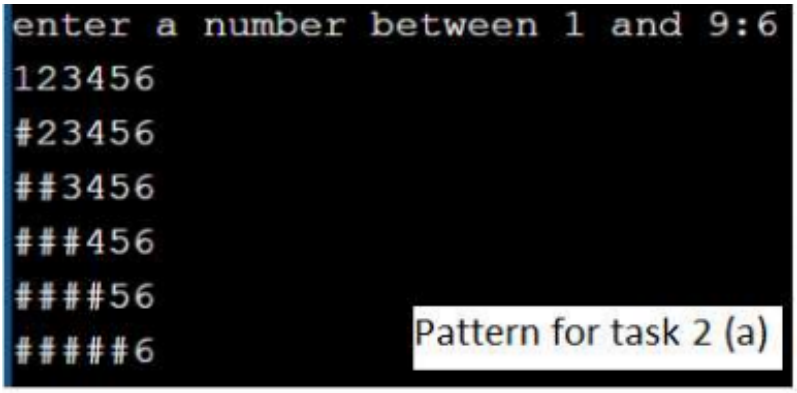
main.c

```c
#include<stdio.h>
int main()
{
    int a[10];
    int max1,max2,i;
    for(i=1;i<10;i++)
    {
        printf("\n Enter the 10 numbers[%d] =",i);
        scanf("%d",&a[i]);
    }
    max1=max2=a[0];

    for(i=1;i<10;i++)
    {
        if(a[i]>max1)
        {
            max2=max1;
            max1=a[i];
        }
        else if((a[i]>max2 && a[i]<max1)||max1==max2)
        {
            max2=a[i];
        }
    }
    printf("Second maximum number is %d",max2);
    return 0;
}
```

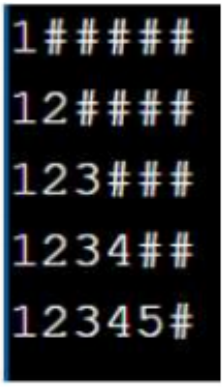
```
Enter the 10 numbers[4] =70

Enter the 10 numbers[5] =50

Enter the 10 numbers[6] =80

Enter the 10 numbers[7] =30

Enter the 10 numbers[8] =20

Enter the 10 numbers[9] =85
Second maximum number is 85
```

Tasks:

Q.5 a) Modify the above Q.1 program to generate the pattern shown in first figure below. b) Modify the above code to generate the pattern shown in second figure.



Pattern for task 2 (b) ➪



Q.6 Modify the program in Question 2 to print 3 pyramids and the number of rows should be twice the input number as shown below.

Q.7 Declare a two dimensional character array and store the values as “Zero”, “One”, “Two”,”Three”, “Four”, “Five”,... Accept a number and display it in words.

Hint : If the number is 3450 then with the help of the array it should be displayed as “Three Four Five Zero”.

Q.8 Write a program for a matchstick game being played between the computer and a user. Your program should ensure that the computer always wins. Rules for the game are as follows:

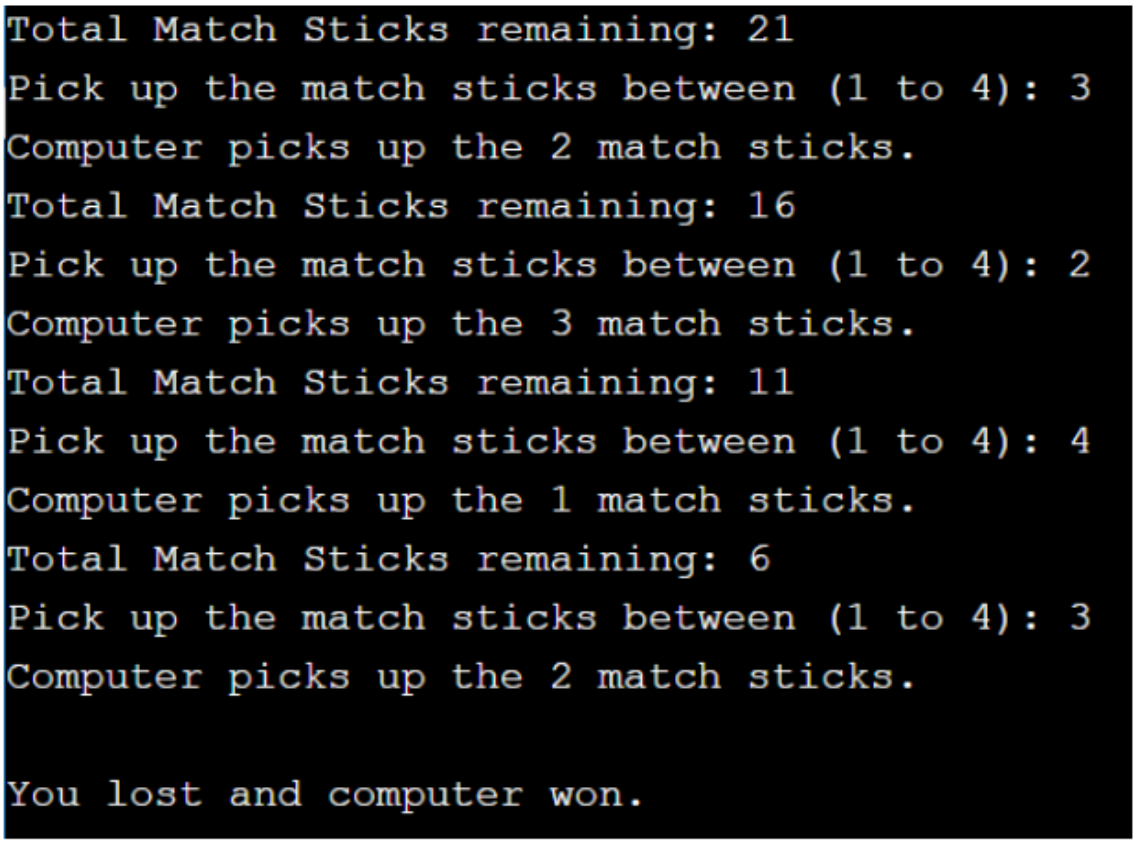
- There are 21 matchsticks,

- The computer asks the user to pick 1, 2, 3, or 4 matchsticks,

- After user picks, the customer does its picking. And this pattern repeats…

- Whoever is forced to pick up the last matchstick loses the game.

A sample run is as below:



Program:

```
#include<stdio.h>
int main() {
   int match_sticks = 21, user_choice, computer_choice;
   while(match_sticks>=1)
   {
      printf("Total Match Sticks remaining: %d\n", match_sticks);
      printf("Pick up the match sticks between (1 to 4): "); scanf("%d", &user_choice);
      if(user_choice > 4) {
         printf("Invalid Entry: Game ends...");  break;
      }
      computer_choice = 5 - user_choice;
      printf("Computer picks up the %d match sticks.\n", computer_choice);
      match_sticks = match_sticks-user_choice-computer_choice;
      if(match_sticks==1) {
         printf("\nYou lost and computer won.");   break;
      }
   }
   return(0);
}
```
