Birla Institute of Technology and Science, Pilani Hyderabad Campus
2nd semester 2020-21
CS F111 (Computer Programming), Lab 7

Q.1 Generate Pascal's triangle of any length. Usage of Conditionals and loops for generating the triangle.

```c
#include<stdio.h>
int main(){
 int bin,p,q,r,x;
 bin=1;
 q=0;
 printf("Rows you want to input:");
 scanf("%d",&r);
 printf("\nPascal's Triangle:\n");

 while(q<r) {
    for(p=40-3*q; p>0; --p)
        printf(" ");
    for(x=0;x<=q;++x)
    {
        if((x==0)||(q==0))
            bin=1;
        else
            bin=(bin*(q-x+1))/x;
        printf("%6d",bin);
    }
    printf("\n");
    ++q;
 }
}
```

```
Rows you want to input:6

Pascal's Triangle:
                                     1
                                  1     1
                               1     2     1
                            1     3     3     1
                         1     4     6     4     1
                      1     5    10    10     5     1
```

```
Rows you want to input:3

Pascal's Triangle:
                    1
                1       1
            1       2       1
```

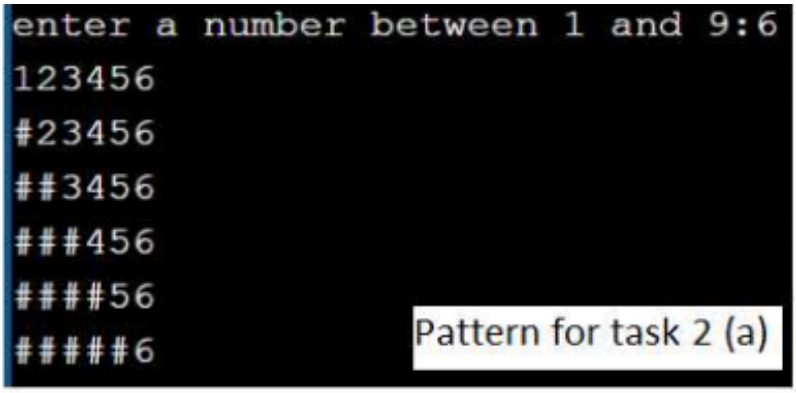
Q.2 Write a program using nested for loops that generate a pattern of numbers and #s as shown in the output.

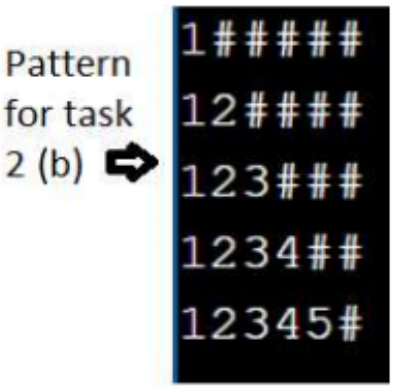
```c
#include <stdio.h>
int main()
{
  int n, row, col;
  printf("enter a number between 1 and 9:");
  scanf("%d", &n);
  for (row = 1; row <= n; row++)
  {
      for (col = 1; col <= n; col++)
          if (row >= col)
              printf ("%d", col);
          else
              printf ("#");
   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

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

Tasks:

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





Q.3 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
       *              *
      ***            ***
     *****          *****
    *******        *******
   *********      *********
  ***********    ***********
 *************  *************
```

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

Q.4 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:

```
Total Match Sticks remaining: 21
Pick up the match sticks between (1 to 4): 3
Computer picks up the 2 match sticks.
Total Match Sticks remaining: 16
Pick up the match sticks between (1 to 4): 2
Computer picks up the 3 match sticks.
Total Match Sticks remaining: 11
Pick up the match sticks between (1 to 4): 4
Computer picks up the 1 match sticks.
Total Match Sticks remaining: 6
Pick up the match sticks between (1 to 4): 3
Computer picks up the 2 match sticks.

You lost and computer won.
```

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);
}
```
