CSE115L – Programming Language I Lab

Lab-09

Nested Loops

Example 1: Write C programs to print the following patterns:

1. Square pattern for N lines. E.g. for N=4:

```
****
****
****
****
```

```
#include <stdio.h>

void main()
{
    int i, j, N;
    printf("No. of rows:");
    scanf("%d", &N);

    //In each of N rows/lines
    for(i=1; i<=N; i++)
    {
        //print N stars
        for(j=1; j<=N; j++)
        {
            printf("*");
        }//j

        //Go to next line
        printf("\n");
    }//i

}
```

2. <u>Hollow</u> square pattern for N lines. E.g. for N=4:

```
****
*  *
*  *
****
```

```
#include <stdio.h>

void main()
{
    int i, j, N;
    printf("No. of rows:");
    scanf("%d", &N);

    for(i=1; i<=N; i++)
    {
        for(j=1; j<=N; j++){
//Print star in first and last row as
well as in first and last column
          if(i==1||i==N||j==1||j==N)
             printf("*");
          else
             printf(" ");
        }//j
        printf("\n");
    }//i

}
```

Example 2: Rhombus pattern for N lines. E.g. for N=4:

```
   ****
  ****
 ****
****
```

```
#include <stdio.h>

void main()
{
    int i, j, N;

    printf("Enter rows: ");
    scanf("%d", &N);
```

```
    for(i=1; i<=N; i++)
    {
        //Print leading spaces
        for(j=1; j<=N - i; j++)
           printf(" ");

        //Print stars after spaces
        for(j=1; j<=N; j++)
            printf("*");

        printf("\n");
    }

}
```

Example 3: Write a C program to print the following patterns:

1.

```
        *
       * *
      * * *
     * * * *
    * * * * *
```

```
#include <stdio.h>
void main()
{
    int i, j, rows;
    printf("Enter no. of rows: ");
    scanf("%d",&rows);

    int space=rows-1;
    for(i=1; i<=rows; i++){
        for(j=1;j<=space; j++)
            printf(" ");

        for(j=1; j<=i; j++)
            printf("* ");

        printf("\n");
        space--;
    }
}
```

2.

```
      1
     1 2
    1 2 3
   1 2 3 4
  1 2 3 4 5
```

```
#include <stdio.h>
void main()
{
    int i, j, rows;
    printf("Enter no. of rows: ");
    scanf("%d",&rows);

    int space=rows-1;
    for(i=1; i<=rows; ++i){
        for(j=1;j<=space; j++)
            printf(" ");

        for(j=1; j<=i; j++)
            printf("%d ",j);

        printf("\n");
        space--;
    }
}
```

Example 4: Write a C program to print all perfect numbers between 1 to n:

```
#include <stdio.h>
void main()
{
    int i, j, n, sum = 0;
```

```
    printf("Enter any number to print perfect number up to: ");
    scanf("%d", &n);

    printf("\nAll Perfect numbers between 1 to %d:\n", n);
    //Iterates from 1 to n and print if it is perfect number
    for(i=1; i<=n; i++)
    {
        sum = 0;

        // print i if the current value of i is a Perfect number
        for(j=1; j<i; j++)
        {
            if(i%j==0)//if j is a divisor of i then add j with sum
            {
                sum += j;
            }
        }
        //now sum = (sum of all proper divisors of i)
        if(sum == i) // If the current value of i is Perfect
            printf("%d, ", i);
    }
}//main
```

Perform the following tasks.

Task 1: Write a C program to print a hollow parallelogram pattern of size m*n. E.g for m=10, n=5 print:

```
     **********
   *          *
  *          *
 *          *
**********
```

Task 2: Write a C program to compute the sum of the following series using nested loop

$$\frac{1}{1}+\left(\frac{1}{1}+\frac{1}{2}\right)+\left(\frac{1}{1}+\frac{1}{2}+\frac{1}{3}\right)+\cdots+\left(\frac{1}{1}+\frac{1}{2}+\cdots+\frac{1}{n}\right)$$

Task 3: Write a C program to print the *n*-th perfect number where *n* is an input.