

## SE 1105 Self Study

### Programming Exercises

1. Write a function that takes 4 integers as parameters and returns the sum of the minimum and the maximum.
2. Write a function that takes 3 integers namely x,y and z , calculates and returns the value of the following expression (|x| means the absolute value of x):

$$|x - y| \times |3z - 2x|$$

3. Write a function that reads 2 integers from the user, and prints all the integers between those to the screen in ascending order seperated by “-” symbol.

**Example:** If the user enters 9 and 2 then the function must print out: 2-3-4-5-6-7-8-9

4. Write a function that takes the size of a box as parameter and draws an empty box with diagonals to the screen

**Example:** If the size is 8 then the function must print out the following:

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

5. Write a function that takes an integer, namely n, as parameter and returns true if n is a perfect square (i.e 4, 9 ,16.. etc. )
6. Write a function that takes an integer, namely n, as parameter and returns the factorial of n (n!).
7. Write a function that takes 2 integers , namely n and m, as parameters and calculates the combination of them (C(n,m)) which can be calculated via the following formula:

$$\frac{n!}{m! \times (n - m)!}$$

Note: You can assume that n is greater than or equal to m

8. Write a function that takes an integer, namely k, as parameter and returns the difference between sum of all positive integers smaller than k that are divisable by 3 and the sum of all positive integers smaller than 2\*k that are divisable by 5.

### Find the output :

Each of the following functions creates a certain figure as output (a letter or a simple shape). Try to find out what the output of the function does look like. You may need to use pen and paper. After solving the exercise you can copy the function and call it from the main() function of a program to see the output. Try to understand how the function produces that output analyzing the loops and executing them step by step if necessary.

```
void printShape1()
{
    for (int i = 0; i <= 10; i++)
    {
        for (int j = 0; j <= 10; j++)
        {
            if (i % 10 == 0 || i + j == 10)
                printf("* ");
            else printf("  ");
        }
        printf("\n");
    }
}
```

```
void printShape2()
{
    for (int i = 0; i <= 10; i++)
    {
        for (int j = 0; j <= 10; j++)
        {
            if (i + j == 5 || i + j == 15 || i - j == 5 || j - i == 5)
                printf("* ");
            else printf("  ");
        }
        printf("\n");
    }
}
```

```
void printShape3()
{
    for (int i = 0; i <= 10; i++)
    {
        for (int j = 0; j <= 10; j++)
        {
            if ( ( i < 5 && ( j == 5-i || j == 5+i ) ) || j == 5 )
                printf("* ");
            else printf("  ");
        }
        printf("\n");
    }
}
```

```

void printShape4()
{
    for (int i = 0; i <= 10; i++)
    {
        for (int j = 0; j <= 10; j++)
        {
            if ((i<5 && (j == i || j == 10 - i)) || (i>=5 && j == 5))
                printf("** ");
            else printf("  ");
        }
        printf("\n");
    }
}

```

```

void printShape5()
{
    for (int i = 0; i <= 10; i++)
    {
        for (int j = 0; j <= 10; j++)
        {
            if ( (i % 6 == 0) ||
                (j % 10 == 0 && i<6) ||
                (i>6 && (j + 1) % 4 == 0) )
                printf("** ");
            else printf("  ");
        }
        printf("\n");
    }
}

```

```

void printShape6()
{
    for (int i = 0; i <= 10; i++)
    {
        for (int j = 0; j <= 10; j++)
        {
            if ( (i + 2*j == 10) ||
                (2*j-i ==10) ||
                (i==5 && 10-i < 2*j && i+10>2*j)
            )
                printf("** ");
            else printf("  ");
        }
        printf("\n");
    }
}

```