

EXERCISE 1

The tasks in the first part of this section provide step by step instructions on how to program in C# using loops. This is followed by a number of tasks for you to complete by applying the knowledge that you have previously gained.

TASK 1: A PROGRAM USING A FOR LOOP

This week design an algorithm, on paper, using pseudocode which prints the sum of 1, 2, 3, ..., to an upper bound determined by user input (e.g. 100). We will then write a program to achieve this and once coded should also compute and display the average of the numbers. The output should look like:

- The sum is 5050
- The average is 50.5

Step 1: Open the Visual Studio File menu, and then select New (or press Ctrl+Shift+n). Then click on Project, select C# Console Application and name it e.g. Prac04Task1.

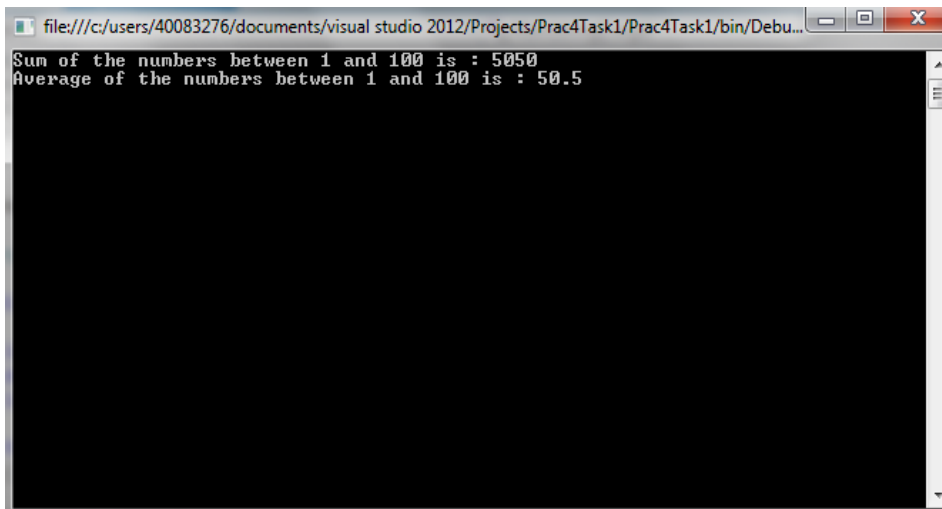
Step 2: Type the following code into the Program.cs class which contains the main method:

```
static void Main(string[] args)
{
    int sum = 0;
    double average;
    int upperbound = 100;

    for (int number = 1; number <= upperbound; number++)
    {
        sum += number;
    }

    //Compute average in double . Beware that int/int produces int.
    //print sum and average;
```

Step 3: Complete the missing parts of the program. Save the class (CTRL +Shift+ S) and choose the Start button from the toolbar (or press Ctrl+F5). For an upperbound equal to 100, example output is shown below.



```
file:///c:/users/40083276/documents/visual studio 2012/Projects/Prac4Task1/Prac4Task1/bin/Debu...
Sum of the numbers between 1 and 100 is : 5050
Average of the numbers between 1 and 100 is : 50.5
```

TASK 2: A PROGRAM USING A WHILE LOOP

Step 1: Modify the program written in the first task to use a "while" loop instead of "for" loop. Replace the for loop with the following code:

```
int number = 1;
while (number <= upperbound)
{
    sum += number;
    number++;
}
```

What is the difference between "for" and "while" loops? If you want to see what is happening in the loops then trace sum and number. You can do this by adding the following line inside each of the loops after the sum calculation:

```
Console.WriteLine ("Current number: " + number + " the sum is " + sum);
```

You can now see what is happening at each iteration of the loop.

TASK 3: A PROGRAM USING A DO WHILE LOOP

Step 1: Modify the program to use a do while loop instead of while loop. Replace the while loop with the following code:

```
int number = 1;
do
{
    sum += number;
    number++;
}while(number<=100);
```

Check that the output from all three loops is the same. What is the difference between for, while and do loops?

TASK 4: Consider the next four loops and determine what, if anything is wrong (please note: that there may be more than one mistake).

```
a) while (c <= 5) {  
    product = product * 5;  
    c = c+1;  
    while (a != b) {  
        sum = sum +a;  
        b = b + 2;  
    }  
}
```

```
b) int x = 1;  
    int total;  
    while (x <= 10) {  
        total = total + x;  
        x = x + 1;  
    }
```

```
c) while (x < 10) {  
    int x = 0;  
    Console.WriteLine ( "x" + x);  
    x = x + 1;  
}
```

```
d) while (x > 0) {  
    x = x - 1;  
    Console.WriteLine ( "x" + x);  
}
```

When you have noticed the errors in the code fragments, create a class and enter the code in Visual Studio. Run the program. You may have to add Console.WriteLine statements to check that the values of the variables are as you would expect.

TASK 5:

Can you spot the error in the following loops?

a) `for(int count = 1, count < 100, count++){`

`Console.WriteLine("Hello");`

`}`

b) `while number < 10{`

`Console.WriteLine ("Hello");`

`number++;`

`}`

TASK 6:

What is the output of the following code fragments? You should try to work this out on paper and then transfer the code into Visual Studio and run it to see what output you actually get. Remember that if you don't get the answer you expect to check both your workings on paper and the code.

a) `for (int count=0; count <= 9; count++){`

`Console.WriteLine (count + " ");`

`Console.WriteLine();`

`}`

b) `for(int i=1; i<10; i++){`

`if (i>2)`

`{`

`Console.WriteLine ("Flower");`

`}`

`}`

TASK 7:

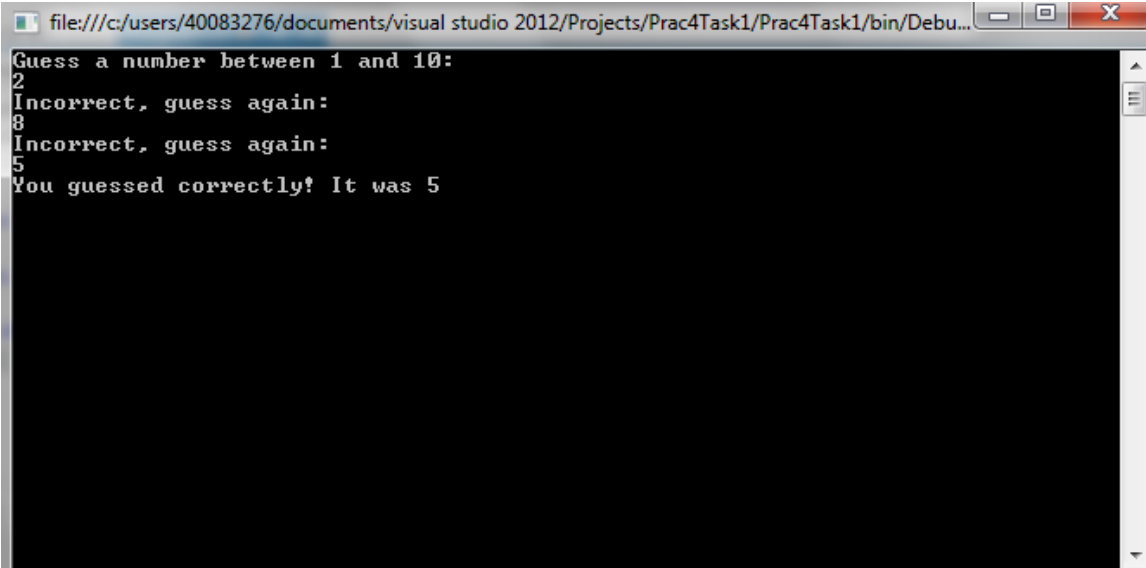
Rewrite both of these fragments of code using for loops instead of while loops –

```
a) int sum = 0 ;  
  
int j = -5 ;  
  
while ( sum <= 350 ){  
  
    sum += j ;  
  
    j += 5 ;  
  
}
```

```
b) int x = 0 ;  
  
while ( x < 500 ){  
  
    Console.WriteLine( x );  
  
    x = x + 5 ;  
  
}
```

EXERCISE 2**TASK 8:**

Create a new project called Prac4Task8. Create an int variable called number and make it equal to 5. Prompt the user to guess a number between 1 and 10. If the user enters number 5, print “You have guessed the number! Well done!” If they do not enter 5, continue to prompt the user to enter a number until they enter 5. Your output should look like below:



```
file:///c:/users/40083276/documents/visual studio 2012/Projects/Prac4Task1/Prac4Task1/bin/Debu...  
Guess a number between 1 and 10:  
2  
Incorrect, guess again:  
8  
Incorrect, guess again:  
5  
You guessed correctly! It was 5
```

Can you now alter this program to take a number from one user as the number to be guessed and for a second user to then guess this? Remember that you should be using user input validation for this program.

TASK 9:

Write a program which prints all the numbers between 1 and 100 that are evenly divisible by four but not by five. You should use a for loop for this question.

TASK 10:

Write a method to print the numbers from 1 to n, where n is provided by the user. If n is 0 or a negative number, print 1.

Plan:

- Initialise the counter to 1
- Get n from the user
- Check the value of n

Do

- Deal with n if it is 0 or negative
- Print the counter
- Add 1 to the counter
- While the counter \leq n

EXERCISE 3**TASK 11:**

Draw a square block of stars of side n, where n is a number entered by the user. For example if the user enters 5, the program should draw:

```
*****
```

```
*****
```

```
*****
```

```
*****
```

```
*****
```

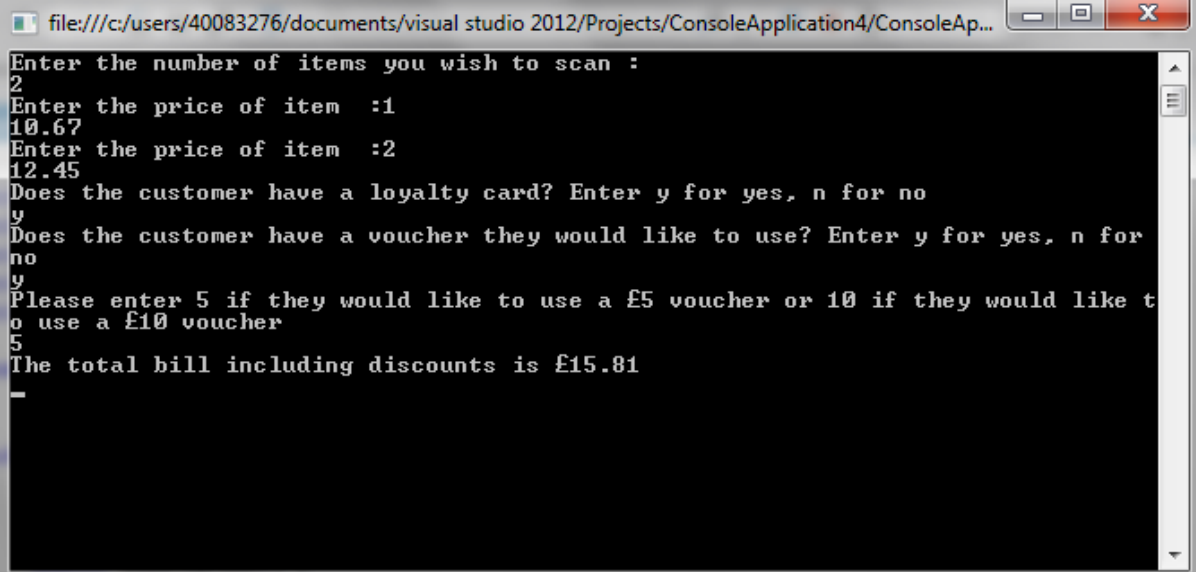
Plan:

- Get n from the user
- FOR counter stepping from 1 to n
- Draw a line of n stars
- Place the cursor at the start of the next line

HINT – You will need to use a nested for loop to do this question.

TASK 14

Look back to Task 12 in practical 3. Locate your Program class and add code which prompts the user to enter the number of items they wish to scan. Save your work. Then locate your SuperMarket class. Amend your scan() method so that it takes in the number of items the user wishes to scan as the parameter. Then add code to your scan() method so that it prompts the user to enter the price of each individual item and total them. Save it as. You will need to use a for loop. Your output should look something like below:



```
file:///c:/users/40083276/documents/visual studio 2012/Projects/ConsoleApplication4/ConsoleAp...
Enter the number of items you wish to scan :
2
Enter the price of item :1
10.67
Enter the price of item :2
12.45
Does the customer have a loyalty card? Enter y for yes, n for no
y
Does the customer have a voucher they would like to use? Enter y for yes, n for no
no
y
Please enter 5 if they would like to use a £5 voucher or 10 if they would like to use a £10 voucher
5
The total bill including discounts is £15.81
-
```