La Salle College
Algorithms & Programming (420AP1AS)

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Assignment 5 – for & while

the *for* loop

Use it when …

you need to repeat an action *n* number of times, where *n* is either specified or deduced
you need to iterate over a specific range of numbers

```
for(int i = startValue; i < endValue; i+ = someValue)
{
    Console.WriteLine(@"This is the body of the for loop.
        The for statement header consists of 3 fields:
        1/ Initialization (of a control variable/starting value):
                executed only once, when control reaches the loop for the first time
        2/ Condition (to keep going): evaluated before each iteration
                if the expression evaluates to true, control enters the body of the loop
                else if false, control breaks out of the loop
        3/ Increment: executed at the end of each iteration
                without it, the loop cannot move to the next value
                beware of infinite loops
        Each full pass through the loop is called an iteration. "
}
```

Ref.:

https://press.rebus.community/programmingfundamentals/chapter/for-loop/
https://www.zenflowchart.com/blog/for-loop-flowchart

the *while* loop

Use it when …

you need to repeat an action an *unknown* number of times
you need to modify the control variable through a non-standard increment
you need to read a file (more on this later …)

```
int i = startValue;
while (i < endValue)
{
    Console.WriteLine(@"This is the body of the while loop.
        The while loop is a more general loop
        Both loops follow the same order of execution
        You need to satisfy the condition to enter the loop and execute its body
        The increment is not limited to i++
        pseudo-code:
            as long as condition C is true, do:
                action 1, 2, ...n
                update C
                back to top ");

    i += someValue;
}
```

Ref.:

https://press.rebus.community/programmingfundamentals/chapter/while-loop/
https://www.quora.com/Whats-the-origin-of-while-loops *(fun/historical/educational read)*

For each exercise, please do:

- *Determine the best-candidate: for loop or while loop*
- *Use the appropriate loop to solve the question*
- *Use the other loop to solve the question*

#1 Write a program that prints all the numbers between 1 and 10 – as well as their sum.

#2 Write a program to print all the characters whose decimal values range between 33 and 126. (ASCII table)

#3 Write a program that prints all the numbers from 0 to 6 except 3 and 6.

#4 Write a program to print the numbers between 1500 and 2700, such that they are divisible by 5 and 7.

#5 Write a program that prompts the user to input an integer. Validate the input, then print this number's multiplication table.

E.g.:
1 x m = …
2 x m = …
3 x m = …
4 x m = …
.
.
.
10xm = …

#6 Write a program that prompts the user for a positive integer. Validate the input, then let the user know whether this number is prime or not. A prime number is only divisible by 1 and itself.

#7 Write a program that prompts the user for two positive integers. Validate the input, then find the value of one number raised to the power of another.

E.g.:
2, 3 = 2 x 2 x 2 = 8
4, 2 = 4 x 4 = 16

#8 Write a program that prompts the user for a positive integer and finds the factorial value of a positive integer entered through the keyboard. The factorial of a number *n* is calculated by multiplying the number by all the numbers that come before it – down to 1.

n! = n x (n-1)!

E.g.:
7! = 7 x 6 x 5 x 4 x 3 x 2 x 1
5! = 5 x 4 x 3 x 2 x 1
3! = 3 x 2 x 1
…

#9 Write a program to guess a number between 1 and 9. If the user guesses wrong, then the prompt appears again until the guess is correct. On a successful guess, the user gets a "Well guessed!" message, and the program will exit. Modify the program to cap the number of guesses.

#10 Write a program that reads a set of integers, and then prints the following: the number of even integers, the number of odd integers, the sum of the even integers, and the sum of the odd integers.