Introduction to programming (NF05A) — **exercices** 2020-2021 —

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Tutorial 1

Exercise 1.

Write a first program that prints:

- “Hello world!”
- Today’s date.
- This week’s number.
- Your email.

Exercise 2.

Here’s the following code:

```c
 #include <stdio.h>

 int main()
 {
   int i = 0;
   int j = 5;

   // Division de j par i
   printf("Division de j par i = %d", j/i);

   return 0;
}
```

- Compile and execute the program.
- Does it work? why?
- Add a break point to the line that need to be changed.
- Determine with the help of the debugger the necessary change.

Exercise 3. Write a program that prints the size of the following types : `int`, `short`, `char`, float and double.

Exercise 4.

1. Write a program that computes the sum of two non zero integers, their difference, product, quotient and remainder of the euclidean division.
2. Write a program that allows us to swap the values of two floating point variables. Write an equivalent program that swaps the values of two characters
3. Write a program that computes the sum of two characters and their difference.
4. Write a program that returns the maximum and the minimum of two values. Assign the maximum (respectively the minimum) to the variable *max* (respectively to *min*)

Exercise 5.

Given two integers `A` and `B` of type `unsigned short` and a floating point number `C` of type `float` with: `A=104` and `C=6.5`.

Complete the following instructions (...) and add comments to each one:

- `A += (...)C ;`
- `A = ~A;`
- `B = A^(A+2);`
- `C = (...)(A<<B);`
- `A = A&(...)C;`

Would the results change if the integers `A` et `B` were of type `int` ?

Exercise 6.

Write a program that takes as input an integer x, a number p and prints x with p reversed bits starting from the position n. The bits are numbered from the right to left and start from 1.

Example: if x = 16 (10000 in binary), n = 2 and p = 3, the returned number is 30 (11110 in binary).

Additional exercises - To go further

Exercise 7. Computing the area of a triangle

The area A of a triangle is given according to the formula $A = \frac{1}{2}BH$ with B is the base of the triangle and H is its corresponding height.

- Declare the two integer variables B and H. What are the value of these variable?
- Declare an integer variable A and assign the value of A according to the expression of the area.
- Compute and print the area A of a triangle of base $B = 7$ and height of $H = 9$.

Exercise 8. Computing the volume of a cone

The volume of a cone V is given by the formula $V = \frac{1}{3}BH$ where H is the height of the cone and B is the area of its circular base. B is given by the formula $B = \pi R^2$ where R is the radius of the circular base.

- Declare two integer variables R and H.
- Define a constant `PI = 3.1416` (use `#define`). Write an instruction that prints its value.
- Compute and print the volume of the cone for $R = 5$, $H = 10$. Limit the printed value to two digits after point.

Exercise 9.

Write a program that converts a binary number to a decimal number. Then, write another program that performs the reverse operation.

Exercise 10.

Write a program that converts an decimal integer to an octal number.

Exercise 11.

Write a program that converts a decimal integer to an hexadecimal number.

Exercise 12.

Write a program that prints the minimum and maximal limits of the following types: `int`, `short`, `char` et `long`.

N.B. use the binary operations >>, ~ and `conversion`.

Exercise 13.

Write a program that performs a swap between the content of two integer arrays of length 10. Is it possible to perform the swap without looping over the two arrays?

Exercise 14.

Write a program that reads a string of length 10 and prints for each character its corresponding ASCII code in binary, octal, decimal and hexadecimal.

Exercise 15.

Write a program that allow us to perform:

- Binary AND between two integers.
- Binary OR between two integers.
- Binary XOR between two integers.
- Ones' complement of an integer.
- Prints the leftmost 8 bits of a short integer.
- Prints the rightmost 8 bits of a short integer.