

**Exercise 1. Constant declaration and arithmetic operations:**

- 1.1. Launch the terminal/commandline.
- 1.2. Create a new directory with the name "Lab02" inside "CSC215".
- 1.3. Write the program "ex1.c" that:
  - **compute the perimeter and area of a circle with a given radius.**  
 $perimeter = 2\pi r, area = \pi r^2$
  - **Note:** use `const` keyword to define  $\pi$
- 1.4. Compile your program.
  - `gcc -ansi -Wall -o ex1 ex1.c`
- 1.5. Run your program. (1 point)  
(UNIX-like / powershell)  
(cmd)
  - `./ex1`
  - `ex1`

**Exercise 2. Refactoring existing code.**

- 2.1. Update your code to use `#define` preprocessor.  
Note: use the following command to copy your previous code.
  - `cp ex1.c ex2.c` (U)
  - `copy ex1.c ex2.c` (W)
- 2.2. Compile and run your program. (1 point)

**Exercise 3. Using libraries (`math.h`).**

- 3.1. The header file `math.h` defines the constant `M_PI`. Modify your program to calculate the perimeter and the area using this constant.
- 3.2. Compile and run your program. (1 point)

**Exercise 4. Evaluating expressions.**

- 4.1. Write the program "ex4.c" that:
  - declares three integer variables: a, b and c.
  - initialize them to a = 1, b = 10, c = 0.
  - prints the following output lines using the `printf` function:
    - `a=<a> b=<b> c=<c>`
    - `a++ + <b> = <a++ + b>`
    - `++a + <b> = <++a + b>`
    - `<a> && <c> = <a && c>`
    - `<a> || <c> = <a || c>`
    - `<a> & 2 = <a & 2>`
    - `<a> | 0 = <a | 0>`
    - `<a> << 2 = <a << 2>`
    - `<a> >> 1 = <a >> 1>`
- 4.2. Compile and run your program. (1 point)

**Exercise 5. Evaluating expressions.**

5.1. Write the program "ex5.c" that prints the following values in the indicated formats:

- `<22/7>` as a float number
- `<22/7>` as a float with 10 decimal digits
- `<22/7>` as a float of length 20 with 10 decimal digits
- `<22/7>` as a float of length 20 with 10 decimal digits and leading 0s
- `<22/7>` as a float with 10 decimal digits and display the sign
- `<22/7>` as a float with 10 decimal digits as a percentage
- `<22/7>` as a float in the scientific notation
- `<31567>` in the hexadecimal system
- `<"Good morning">` the first 4 characters of the string
- `<"Good morning">` the first 4 characters of the string reserving a length of 10

5.2. Compile and run your program. (1 point)

**Lab assignment:** (5 points)

Write a C program assignment.c that prints the powers of the integer variables  $a = 1$ ,  $b = 2$  and  $c = 3$  in a tabular format as below:

**Expected output:**

```
::::: Powers Table ::::::  
Number      Square      Cube      4th power  
1            1           1         1  
2            4           8         16  
3            9          27        81
```

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**Bonus exercise:** (5 points)

Write a program to swap the two bits at given positions in an integer. The program should read from the user the integer and the two positions.