**Homework – teams of 2 students**

* **The students from the same team will work separately and when they have the final results they will put all together in the same final document. The name of the file will contain the names of the members (ex: Pop\_Duma-team). One file per team will be uploaded in the private channel of the group-Homework before 1.11.2020, 10pm.**
* **Write in the document all the intermediate calculations and necessary explanations. For each part of a subject write the student’s name which solved it.**
* **The homework can be handwritten on paper and then scanned or written in an editor (Word).**

**Subject 1: operations**

* Students will work with two bases: **b1** and **b2**, one of them is less than 10 and the other one is 16, b1>2, b2>2.
* **Student 1** chooses **b1, b2, x, y, z**, **f** and performs the operations:

**x(b1) + y(b1) = s(b1),** x has 6 digits and y has 5 digits

**z(b2)\* f(b2) = p(b2),** z has 6 digits, f is a digit, f≠1, f≠0.

* **Student 2** receives **s, y, p, f,** from Student 1 and performs the following operations to verify the correctness of the results obtained by Student 1:

**s(b1) - y(b1)= ? (b1**)

**p(b2) : f(b2)= ? (b2)**

**Subject 2: conversions of real numbers choosing the appropriate methods**

* **Student 2:**
  + chooses **b** (source base) and **h** (destination base) such that **b ≠ 10, h ≠ 10** and **b < h.**
  + choosesthe initial real number **x(b)** having 5 digits at the integer part and 3 digits at the fractional part
  + converts **x(b**) into base **h,** with a precision of 3 digits, obtaining **y(h)**
* **Student 1** receives **y(h)** from Student 2 and converts **y(h)** into base **b,** with a precision of 3

digits to verify the correctness of the result obtained by Student 2

* Don’t use rapid conversions!
* Don’t use base 10 as an intermediate base!

**Subject 3: representations**

**Option 1: addition and subtraction of integers in complementary code**

* **Student 1**
  + chooses three integer positive decimal numbers (at least 5 digits each): x, y, z , such that x < y < z.
  + represents in direct, inverse and complementary codes on 16 bits, x, -x, y,-y, z, -z.
* **Student 2**
  + receives from Student1: [x] compl, [-x] compl, [y] compl, [-y] compl, [z] compl, [-z] compl.
  + performs in complementary code the following operations:

[x + y]compl, [x – y] compl, [z – x] compl , [-z - x] compl

* + from the complementary codes obtained in the previous step calculates the corresponding decimal values.

**Option 2: addition and subtraction of subunitary numbers in complementary code**

* **Student 1**
  + chooses three subunitary positive decimal numbers (at least 3 digits at the fractional part): x, y, z , such that x < y < z.
  + represents in direct, inverse and complementary codes on 16 bits, x, -x, y,-y, z, -z.
* **Student 2**
  + receives from Student1: [x] compl, [-x] compl, [y] compl, [-y] compl, [z] compl, [-z] compl.
  + performs in complementary code the following operations:

[x + y]compl, [x – y] compl, [z – x] compl , [-z - x] compl

* + from the complementary codes obtained in the previous step calculates the corresponding decimal values.

**Option 3: fixed-point representation of real numbers**

* **Student 1**:
  + chooses a real number **x** in decimal, with 5 digits at the integer part and 2 digits at the fractional part.
  + represents **x** in fixed-point notation, on 32 bits, with I=15, F=16
  + writes the content of the memory location in hexadecimal: M(16)
* **Student 2:**
  + receives M(16) from Student 1and finds the real decimal number having M(16) as its fixed-point representation, with I=15, F=16, to verify the correctness of the result obtained by Student 1

**Option 4: floating-point representation of real numbers, with mantissa>1**

* **Student 1**:
  + chooses a real number **x** in decimal, with 5 digits at the integer part and 2 digits at the fractional part.
  + represents **x** in floating-point notation, SP, mantissa >1
  + writes the content of the memory location in hexadecimal: M(16)
* **Student 2:**
  + receives M(16) from Student 1and finds the real decimal number having M(16) as its floating-point representation, SP, mantissa >1, to verify the correctness of the result obtained by Student 1

**Option 5: floating-point representation of real numbers, with mantissa<1**

* **Student 1**:
  + chooses a real number **x** in decimal, with 5 digits at the integer part and 2 digits at the fractional part.
  + represents **x** in floating-point notation, SP, mantissa <1
  + writes the content of the memory location in hexadecimal: M(16)
* **Student 2:**
  + receives M(16) from Student 1and finds the real decimal number having M(16) as its floating-point representation, SP, mantissa <1, to verify the correctness of the result obtained by Student 1