Project 3 (0.2 points)

- *Input*: non-zero natural number n

- *Output*:

  1. the number of bases of the vector space $\mathbb{Z}_2^n$ over $\mathbb{Z}_2$
  2. the vectors of each such basis (for $n \leq 4$)

Example: The vector space $\mathbb{Z}_2^2$ over $\mathbb{Z}_2$ has 4 vectors, namely $(0,0), (0,1), (1,0), (1,1)$. Its dimension is 2, so every basis has two vectors. The first vector v_1 may be chosen in 3 ways ($v_1 \neq 0$), while the second vector v_2 may be chosen in 2 ways ($v_2 \neq (0,0)$ and v_2 different of any linear combination of other non-zero vectors, which in this case means $v_2 \neq v_1$). Hence there are $3 \cdot 2 = 6$ bases.

- *Input*: $n = 2$

- *Output*:

  1. the number of bases of the vector space $\mathbb{Z}_2^2$ over $\mathbb{Z}_2$ is 6
  2. the vectors of each such basis are:

     ((0,1),(1,0))   ((1,0),(1,1))
     ((0,1),(1,1))   ((1,1),(0,1))
     ((1,0),(0,1))   ((1,1),(1,0))

Note:

- Any (reasonable) programming language may be used.

- The solutions will consist of the source code with comments (do not send executable files!) and at least 5 relevant input and output files, and will be sent to the e-mail address: septimiu.crivei@ubbcluj.ro.

- If necessary, you will be asked to explain your solution.

- The first 25 solutions will be rewarded.

- The final deadline is January 14, 2024.