Lab #4: Decrease and Conquer

Students implemented the following problems using "Decrease and Conquer" technique.

1. **Topological Sorting**:

Input	Output
Content of the *"input_1.txt"* file: - 1st line: positve integer n represent the number of courses. - Next `k` lines: Courses relationships. - End with 0.	Topology order of courses.
Example: 5 3 1 2 *(1 and 2 need to be done before 3)* 4 3 *(3 need to be done before 4)* 5 3 4 *(3 and 4 need to be done before 5)* 0	1 2 3 4 5

2. **Josephus problem**: Let n people stand in a circle. Starting the count with person number `1`, we eliminate every second person until only one survivor is left. The problem is to determine the survivor's number `J(n)`.

Input	Output
Content of the *"input_2.txt"* file: - Positive integer n represent the amount of people in the circle.	- Eliminated people (time order) - Last survivor.
Example: 5	2 4 1 5 3

3. **Selection problem**: Finding the kth *smallest* number in an array $S = \{s_1, s_2, ..., s_n\}$ với $k \in [1, n]$

Input	Output
Content of the *"input_3.txt"* file: - 1st line: positive integer n represent size of the given array. - 2nd line: n real numbers separated by a single space " ". - 3rd line: positive integer k	- k^{th} *smallest* number required.
Example: 5 1.1 7.3 2.5 4.6 3.3 3	3.3

4. **Interpolation Search**: Find the value `k` from the given array which has n elements.

Input	Output
Content of the *"input_4.txt"* file: - 1st line: positive integer **n** represent size of the given array - 2nd line: n real numbers sorted ascendingly. Separated by a single space " ". - 3rd line: Required real **x** number	- Position (from 0) of **x**.
Example: 5 1.1 2.2 3.3 4.4 5.5 2.2	1

- ## FILE SUBMISSION REGULATION

  - Only submit files with `.cpp` extensions: `1.cpp`, `2-1.cpp`, `2-2.cpp` ... . **Project submission is illegal**.

  - `.cpp` files must be located in `MSSV` folder, then be compressed into `MSSV.zip(.rar)`.

  - Source code must receive input and return output as specified for each problem. Submissions with wrong regulation will result in a "0" (zero).

  - Plagiarism and Cheating will result in a "0" (zero) for the entire course.

  - Contact: **bhthong@fit.hcmus.edu.vn** for more information.

END