Algorithm Engineering
Midterm - 8 November 2021 – time 45 minutes

Question #1 [scores 5]. Simulate the algorithm Snow Plow on the sequence: (2, 8, 4, 3, 2, 1, 0) by assuming a memory size M=3.

Question #2 [scores 5+5]. You are given a set of pairs (key, priority) to insert in a Treap according to the following order: (5,1), (9,6), (3,2), (7,8).

- Show the Treap resulting from the insertion of every key above
- Insert then the pair (8,3)

Question #3 [scores 2+2+4+2]. You are given the set of integer keys S = {1, 3, 7, 10, 12}, show how to encode them via:

- Delta coding of each integer, NOT use the gap-coding (i.e. the difference between adjacent keys.
- Rice coding of each integer with parameter k=3, again NOT use the gap-coding (i.e. the difference between adjacent keys.
- Elias-Fano coding
- Show how to execute Access(3) over the Elias-Fano coding of the previous point by detailing the steps.

Question #4 [scores 5] Sort the following strings via Multi-key Quicksort S = { castro, abba, mom, camel, astra, asso } by using as pivot always the first string of the set to sort.