Algorithm Engineering
8 June 2021 – time 40 minutes

Question #1 [scores 6]. Construct a minimal ordered perfect hash for a set of 5 strings {aba, abb, baa, bab, bbb} by assuming hash functions

$h_1(s) = s[1] + 3 * s[2] + 5 * s[3] \bmod 11$

and

$h_2(s) = (s[1]+s[2]) * 3 + s[3] \bmod 11$ (hence m=11),

where s[i] is the i-th character of string s represented as a=2 and b=3.

Question #2 [scores 5+5]. Given the string S = abbarabba, compute its
- parsing LZSS (namely the one that emits *pairs*)
- parsing LZW, where you can assume the code for a=1, b=2, r=3

Question #3 [scores 4+4]. Given the sequence of integers S=(1, 6, 15, 18, 21, 24, 30), encode each of them using:
- Rice code with k=3 by do not applying gap-coding before.
- Elias-Fano encoding.

Question #4 [scores 4+2]
- Show the Suffix Array of the string S = abababc
- Show the first two steps of using it to search for the string "bb" into S.