

## Homework sheet 2, due 1 December 2022 at 13:30

If you use sage for your computations note that you can compute modulo a polynomial using `%`. In Pari the function `Mod` also works for polynomials.

Submit your homework by encrypted and signed email to all TAs. Do not include Tanja.

Put your teammates in cc and do not forget to attach your public key and those of your teammates, else the TAs cannot reply to you.

1. For both of the following sequences

$$s_{j+8} = s_{j+5} + s_{j+2} + s_{j+1} + s_j \quad s_{j+6} = s_{j+3} + s_j$$

do the following subexercises. The points are for both LFSRs.

- (a) Draw the LFSR corresponding this sequence. 2 points
- (b) State the state-update matrix and compute its order. 5 points
- (c) State the characteristic polynomial  $P$  and compute its factorization. 3 points
- (d) For each of the factors of  $P$  compute the order. 4 points
- (e) What is the longest period generated by this LFSR? Make sure to justify your answer. 3 points
- (f) State the lengths of all subsequences so that each state of  $n$  bits appears exactly once. 3 points