CR12

https://www.lirmm.fr/~ochem/slides1.pdf

HW1: *d*-directed VS critical exponent

- w is d-directed if for every factor f of w with $|f| = d$, f^R is not a factor of w.
- *abcab* is a repetition with period 3 and exponent $5/3$.
- *ababa* is a repetition with period 2 and exponent $5/2$.
- α-free: no exponent $\geqslant \alpha$.
- (α^+)-free: no exponent $> \alpha$.
- TO DO: find all pairs (d, α) such that there exists an infinite binary word that is d-directed and (α^+)-free.

HW2: Gangloff and Talon

- https://www.sciencedirect.com/science/article/abs/pii/S0304397520301572
- https://www.lirmm.fr/~ochem/gangloff2020.pdf
- TO DO: Thm 7, Thm 9: (minimal) total domination

HW3: Languages with small exponential growth

- There are 2^n binary words.
- There are $n+1$ binary words avoiding $\texttt{01}$.
- There are $\Theta(\varphi^n)$ binary words avoiding $\texttt{11}$.
- There are exponentially many binary words avoiding $\{\texttt{11}, \texttt{000}\}$.
- TO DO: Find the growth rate given a finite set of forbidden factors.
- TO DO: Use that to find the family of exponential languages with least growth rates.

HW4: Grytczuk and Stankiewicz

- `https://arxiv.org/pdf/2011.12822.pdf`
- Theorem 5: $X_5 = X_1^R$ but $|S_1| = 42$ and $|S_5| = 41$.
- Problem 1: multiplicativity.

HW5: Growth rate of abelian square-free words

- `https://www.lirmm.fr/~ochem/samsonov2011.pdf`
- Extendability of (abelian) square-free words.
- TO DO: compute a set of two-way extendable abelian square-free words.
- TO DO: get an upper bound on the growth rate.

HW6: Additive cubes over $\{-1, 0, 1\}$

- https://www.lirmm.fr/~ochem/lietard.pdf
- Thm 8 p. 204/214
- Are additive cubes avoidable over $\{1, 2, 3, 4\} = \{-3, -1, 1, 3\}$?
- Are additive cubes avoidable over $\{1, 2, 3\} = \{-1, 0, 1\}$?

HW7: Subtypes for *AABB.ABBA*

- `https://www.lirmm.fr/~ochem/morphisms/aabbc.pdf`
- `https://www.lirmm.fr/~ochem/morphisms/main.pdf` (p. 10)
- Are there subtypes for the exponential case?

HW8: Consecutive additive squares

- *AABB* is not 2-avoidable but *AABBCC* is 2-avoidable.
- Over two letters, "abelian" is the same as "additive".
- Are there infinite binary words containing only finitely many consecutive additive squares?

HW9: Does 10 have a friend?

- Is there $n > 10$ such that $\sigma(n)/n = 9/5$?