Master 2 Mathematics and Computer Science Symbolic Dynamics. Quizz

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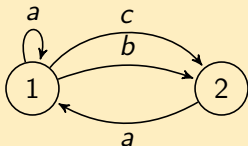University Gustave Eiffel
Laboratoire d'informatique Gaspard-Monge UMR 8049

Quizz

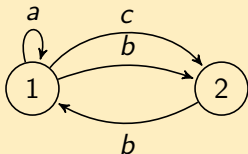# Quizz on sofic shifts

Exercise 1

Is the shift space of labels of bi-infinite paths of the following automaton

- a sofic shift?
- an irreducible sofic shift?
- a shift of finite-type?
- a shift conjugate to an edge shift? If yes, exhibit a conjugacy.
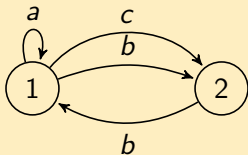
Quizz on sofic shifts

Exercise 2

Is the shift space of labels of bi-infinite paths of the following automaton

- a sofic shift?
- an irreducible sofic shift?
- a shift of finite-type?
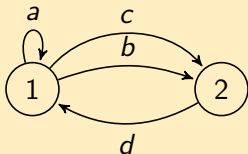- a shift conjugate to an edge shift? If yes, exhibit a conjugacy.

Exercise 3

Compute the entropy of the shift space of labels of bi-infinite paths of the following automaton

Compute the entropy of the shift space of labels of bi-infinite paths of the following automaton.
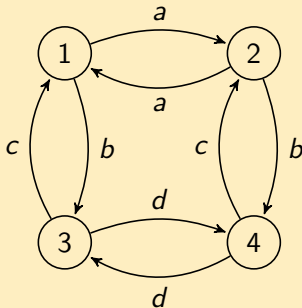Compute its zeta function.

Exercise 5

Is the shift space of labels of bi-infinite paths of the following automaton

- a sofic shift?
- an irreducible sofic shift?
- a shift of finite-type?

Exercise 6

Let $X = X_F$ be the shift space on $A = \{a, b\}$ where $F = \{aaa\}$.

- Is X a shift of finite-type?
- Is X an irreducible shift of finite type?
- compute a local automaton presenting X.

Exercise 7

Let $\sigma \colon \{a, b, c\}^* \to \{a, b, c\}^*$ be the substitution defined by
$a \mapsto bac, b \mapsto bb, c \mapsto cc$.

- Is this substitution primitive?
- Is this substitution growing?
- Describe $X(\sigma)$. What are the points in $X(\sigma)$?
- Is $X(\sigma)$ a minimal shift space?

Exercise 8

Let $\sigma \colon \{0,1,2\}^* \to \{0,1,2\}^*$ be the substitution defined by $0 \mapsto 0012, 1 \mapsto 12, 2 \mapsto 012$.

- Is this substitution primitive?
- Is this substitution growing?
- Is $X(\sigma)$ a minimal shift space?
- Is the block complexity $p_{X(\sigma)}(n) = \Theta(n)$?