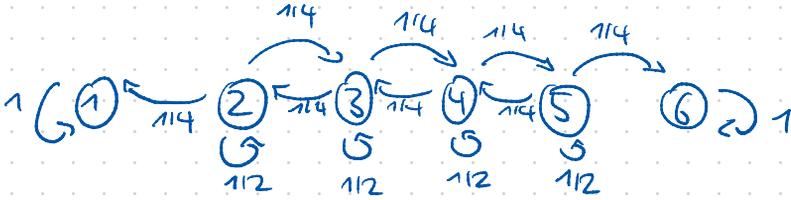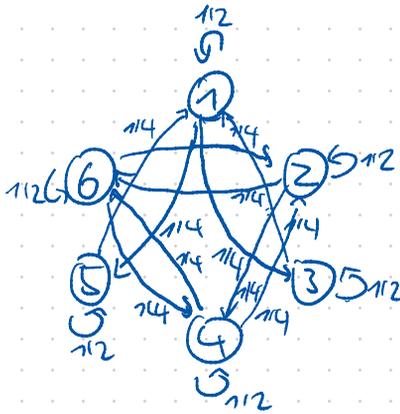# 1

(a)

(b) not irreducible since $P_{1j} = 0 \quad \forall j \neq 1$

aperiodic since $P_{ii} > 0$ (true for all i here, but one would suffice)

2

(a)

(b) not irreducible: when the chain is started in an even state, it can never reach an odd state (and vice versa).

E.g. $P(X_n = 2 \mid X_0 = 1) = 0 \quad \forall n \in \mathbb{N}$

aperiodic for same reason as in (a)