Exercise 1 (Expressivity, 11 minutes) *Recall that CCS! denotes CCS with the replication or bang process* $!P$*. Given a CCS! process* P*, recall that the language generated by* P*,* $L(P)$*, is the set of all finite maximal sequences generated from the labeled transitions of* P*. More precisely,*

$$L(P) = \{s \in \mathcal{L}^* \mid \exists Q : P \stackrel{s}{\Longrightarrow} Q \wedge \forall \alpha \in \mathcal{L} \cup \{\tau\} : Q \stackrel{\alpha}{\not\longrightarrow}\}.$$

where $\mathcal{L}$ *denote the set of visible actions in CCS!.*

- *Question: The regular set*

$$\{a^n \mid n \geq 0\}$$

  is generated by one of the following of processes. Which one?

  1. *The process* $!(a.0)$
  2. *The process* $(\nu u)(\overline{u}.0 \mid !(u.a.\overline{u}.0) \mid u.0)$
  3. *The process* $(\nu u)(\overline{u}.0 \mid !(u.a.0) \quad \mid u.0)$

Exercise 2 (Probability, 7 minutes) *Consider the following process P:*

$$a.(b.0 \oplus_{1/2} c.0) + a.(\tau.b.0 + \tau.c.0)$$

Assume that a, b and c are pairwise different. P gives rise to the following transition graph:

- How may different schedulers we have for P?
- What is the probability that b will be executed, under the different schedulers?