

Exercise Sheet 10

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Due: Tue, Jan 20

Exercise 10.1 PDS Modeling

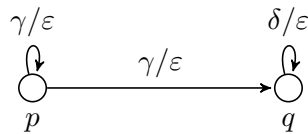
Give a pushdown system that models the following program where $r()$ is a function that randomly returns 0 or 1. Describe how you represent the program counter and the value of the variable x . *Hint: In a first step, assign each line in the code a unique label.*

```

void m()                void s()                int x=0;
    x=1;                x=0;                void main()
    if(r()==1) s();     if(r()==1) m();     m();
    
```

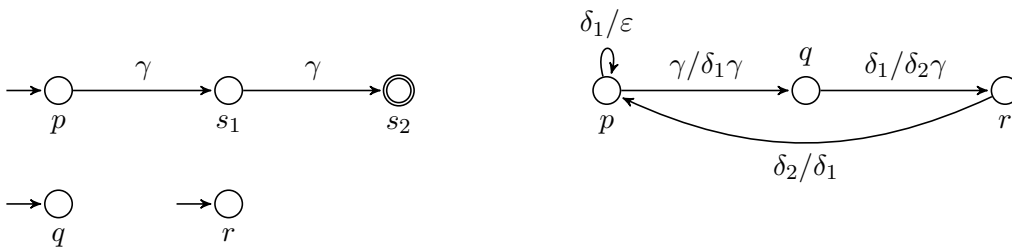
Exercise 10.2 pre* Computation

Use the algorithm given in the lecture notes to determine $\text{pre}^*(C)$ in the pushdown system below, where $C = \{(q, w) \mid w \in \{\gamma, \delta\}^* \text{ and } |w| \text{ is even}\}$.



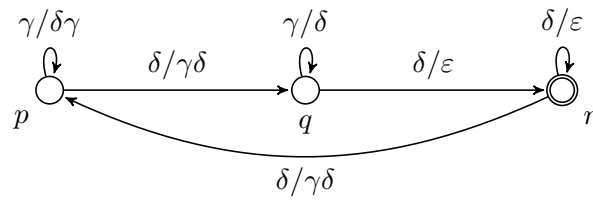
Exercise 10.3 pre* Computation

Compute A_{pre^*} starting from A (left) and P (right) given below.



Exercise 10.4 Büchi Pushdown Systems

Solve the accepting run problem for the Büchi-pushdown system over $\Gamma = \{\gamma, \delta\}$ below:



- (a) Find all $(s, \gamma) \in Q \times \Gamma$ such that $(s, \gamma) \rightarrow^+ (r, u) \rightarrow^* (s, \gamma \cdot v)$ for some $u, v \in \Gamma^*$.
- (b) Compute $A_{\text{pre}^*(C)}$ for $C = \{(s, \gamma \cdot \Gamma^*) \mid (s, \gamma) \text{ is a configuration found in (a)}\}$.

Note: the lowercase $\gamma \in \Gamma$ in (a) and (b) is an arbitrary symbol.