Randomised Algorithms
Winter term 2022/2023, Exercise Sheet No. 3

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November 2, 2022

Exercise 1.

Exercise 2.

Exercise 3.

(a) *We start from Top to Bottom, we assign 1 to the root, and follow these two startegies to assign the levels below until we reach the leaves:*

If the parent is $\vee$*:*

- *First child:* 0
- *Second child: Parent Value*

If the parent is $\wedge$*:*

- *First child:* 1
- *Second child: Parent Value*

(b) *The following figures captures the algorithm:*

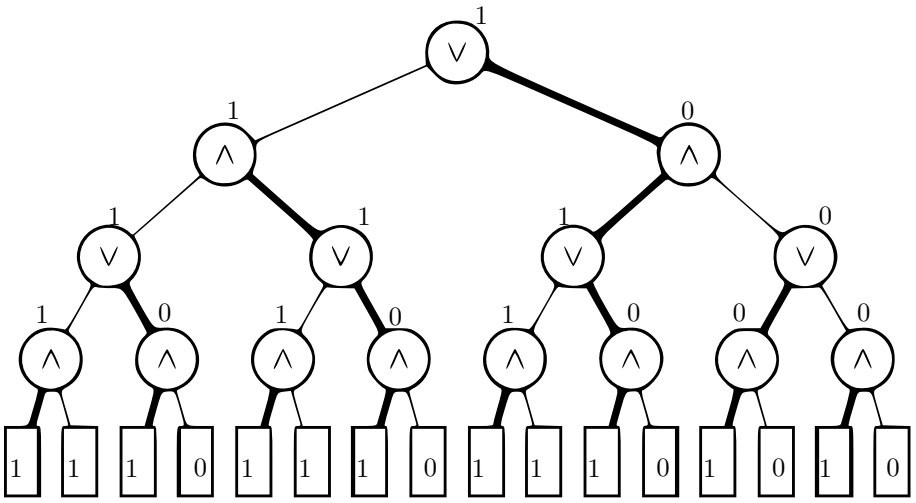

Figure 1: graph-incscape

Exercise 4.

We have for $i, j \in \{1, \ldots, n\}$:

$$\min_i M_{i,j} \leq M_{i,j} \leq \max_j M_{i,j}$$

Hence, for $i \in \{1, \ldots, n\}$:

$$\max_j \min_i M_{i,j} \leq \max_j M_{i,j} \text{ (The RHS is independent of } j)$$

Finally, we get:

$$\max_j \min_i M_{i,j} \leq \min_i \max_j M_{i,j}$$