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Homework for

Komplexitätstheorie
A. Y. 16/17

Assignment 8

Exercise 8.1

Verify the hierarchy of p-grades in Figure 11 of the lecture notes. You have to show that every node in the hierarchy represents a p-grade and that every edge in the hierarchy represents a $<_{pol}$-relation.

Exercise 8.2

Argue that the condition $L_1 \leq_{POL} L_2 \Rightarrow \bar{L}_1 \leq_{POL} \bar{L}_2$ is satisfied with $\leq_T$ resp. $\leq_L$ in the role of $\leq_{POL}$.

Exercise 8.3

Design padding functions for the languages CLIQUE and INDEPENDENT SET and show that they have the required properties.

Exercise 8.4

Consider the following CNF-formula

$$F = (\bar{x}_1 \vee \bar{x}_2 \vee \bar{x}_3) \wedge (x_2 \vee x_3 \vee x_4) \wedge (x_1 \vee x_2 \vee \bar{x}_4).$$

a) Construct the complete tree T for F as in the proof of Berman's Theorem;

b) Give the tree T' resulting from the *lazy evaluation*, one of the pruning rules used in the proof (for more details, see page 83 of the lecture notes).