

Home work for
Fundamental Algorithms
SS 2007
Sheet 12

Exercise 28: Prove: Let $X, Y \in \Sigma^+$ be two words with $XY = YX$. Then there exists a word $W \in \Sigma^+$ and $i, j \in \mathbb{N}$ such that $X = W^i$ and $Y = W^j$.

Exercise 29: Let $\Sigma = \{a, b, c\}$, $P = abcabcacab$, $T = babcbabcabcaabcabcabcacabc$. Compute the string matching automaton M_P of P .

Exercise 30: Suppose that $\Sigma = \{0, \dots, d - 1\}$ so that each string $P = p_1 \dots p_m$ can be interpreted as a d -ary number $d(P)$.

- a) Show how to compute $d(p_1 \dots p_m)$ in time $O(m)$.
- b) Given a text T show how to compute all values $d(T_{1,m}), \dots, d(T_{n-m+1,n})$ in time $O(n)$.
- c*) Let ω be the largest number your computer is able to process in one computer word. Show how to modify the function `NAIVESTRINGMATCHER` to compare numbers instead of strings. Note that numbers can be processed in constant time only if the numbers do not exceed ω . What is the running time of your modification ?