

5th Exercise sheet for Advanced Algorithmics, SS 13

Hand In: Until Wednesday, 22.05.2013, 12:00am, Exercise sessions, hand-in box in stairwell 48-6 or email.

Problem 8

In lecture, we have seen a procedure to determine optimal VERTEX COVERS in time $\mathcal{O}(1.33^k)$ using search trees.

- Show that case 3 (regular graph) occurs at most three times in every branch!
- If case 3 could occur arbitrarily often, how large would the largest search trees be?
- If only the number of 2-regular graphs was bounded, how large would the largest search trees be?

Problem 9

- Assuming parameter k in an input for CLOSEST SUBSTRING is minimal and s_1 is not already a feasible solution, prove or disprove that algorithm $\text{CSd}(s_1, k)$ can find every feasible (and therewith optimal) solution.
- We consider a restricted version of the CLOSEST SUBSTRING problem. We again require k to be optimal, and furthermore that there are input words s_i and s_j with $d_H(s_i, s_j) = 2k$.

Show that this problem can be solved by an algorithm with runtime in $\mathcal{O}(4^k)$.