Universität Greifswald
Institute für Mathematik and Informatik
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2. Übung "Bioinformatik", SS 16

Aufgabe 1: (10 Credits)
Prove *Lemma 2* stated in the lecture:
Given a set of strings $P = \{S_1, \ldots, S_r\}$ that is substring-free and a permutation $\Pi = \sigma_1 \ldots \sigma_r$ of the integers $1, \ldots, r$ that implies the ordered set $\{S_{\sigma_1}, \ldots S_{\sigma_r}\}$. Let

$$S(\Pi) = \text{pref}(S_{\sigma_1}, S_{\sigma_2})\text{pref}(S_{\sigma_2}, S_{\sigma_3}) \ldots \text{pref}(S_{\sigma_{r-1}}, S_{\sigma_r})S_{\sigma_r}$$

Show that $S(\Pi)$ is a superstring $S(P)$.

Aufgabe 2: (20 Credits)
Implement an algorithm in `C++` that determines the shortest common supersequence (SCS) of n user-defined strings.
Give the computed results and the intermediate steps of your algorithm on the strings $S_1 =$`CCTT`, $S_2 =$`ACCCT`, $S_3 =$`TTC`.
Determine the runtime of your algorithm depending on the number of the strings and their length.
Send the source-code via email to the tutor Stefanie König.

Aufgabe 3: (10 Credits)
Let X, Y, Z and Z' be distinct strings s.t. the set $\{X, Y, Z, Z'\}$ is substring-free.
Prove the following statement:

If $\text{ov}(X, Y) \geq \max\{\text{ov}(X, Z), \text{ov}(Z', Y)\},$ then $\text{ov}(X, Y) + \text{ov}(Z, Z') \geq \text{ov}(X, Z) + \text{ov}(Z', Y)$.

Deadline: Monday - April 18, 2016 - 2pm