Exercises – Algorithms for Genome Research

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http://wiki.techfak.uni-bielefeld.de/gi/Teaching/2014winter/AlgoGR

Exercise List 3 — 14.11.2014

Discussion of exercises on: 21.11.2014

Exercise 1 For the following permutations, answer the questions:

$\pi = (0\ +3\ +5\ +4\ +6\ +2\ +1\ +7\ -8\ +9)$

$\pi = (0\ +2\ +4\ +3\ +5\ +1\ +6\ +8\ +10\ +9\ +11\ +7\ +12\ +14\ +16\ +15\ +17\ +13\ +18)$

$\pi = (0\ +2\ +3\ -4\ +5\ +7\ +6\ +8\ +1\ +9\ +11\ +10\ +12)$

$\pi = (0\ +7\ +1\ -2\ +3\ +5\ +4\ +6\ +8\ +10\ +9\ +11)$

$\pi = (0\ +1\ -2\ +3\ +7\ +5\ +6\ +4\ +8\ +10\ +13\ +11\ +12\ +9\ +13)$

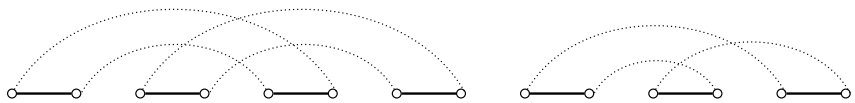
(a) Find the components in the permutation, and the type of each component.

(b) Compare the components that you found with the breakpoint graph components. *Tip: use the available software*

(c) Draw the component tree T_P.

(d) What is the reversal distance?

Exercise 2 Consider the following breakpoint graph.



(a) What is the reversal distance for this breakpoint graph?

(b) Find a permutation π that has this breakpoint graph.

Exercise 3 After a *cycle merge* reversal, that is, a reversal defined by black edges in two different cycles, the two cycles are merged into one. Prove that this new cycle is always oriented. *Tip: What happens when we apply the same reversal again?*