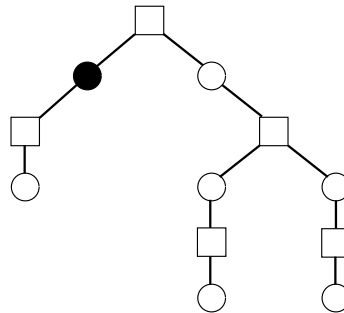


**Algorithms for Genome Rearrangement**  
**Summer 2017**

**Exercises**

**Exercise 04, 12.05.2017**

1. Write an algorithm in pseudo-code that receives as input a (signed) permutation  $\pi$  of the set  $\{0, \dots, n\}$ , where the first element is zero and the last is  $n$ , and returns the number of cycles in the breakpoint graph  $BP(\pi)$ . What is the complexity of your algorithm? Assume that you can perform simple set operations (add/remove element, access element) in constant time. (3 P)
2. Consider the following component tree  $T_P$ : (3 P)



Find a permutation  $\pi$  whose component tree is  $T_P$ .

3. Sort the permutation  $\pi = (2 \ -5 \ 3 \ -1 \ 4)$ . Indicate all intermediate steps by drawing the overlap graph  $OV(\cdot)$  and include the reversal scores as annotation to each vertex. Indicate your choice of a safe reversal by marking the corresponding vertex in  $OV(\cdot)$ . (4 P)

**Hand in solutions before tutorial on 19.05.2017**