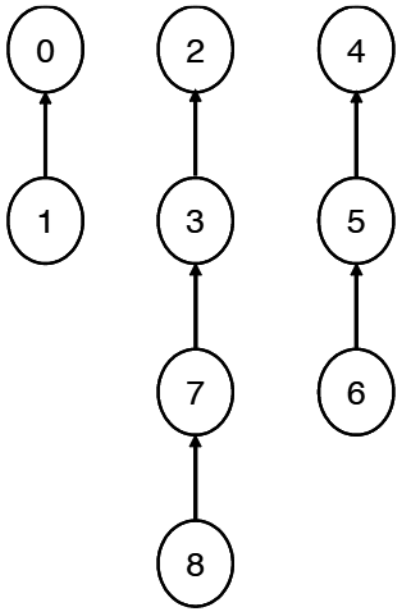
Disjoint Sets

Consider the forest below, representing disjoint sets for the integers 0 to 8. Assume the ranks of the trees ***initially*** are ***equal*** to their heights, measured as numbers of arcs. Assume the FIND-SET operation performs ***path compression***. Assume the UNION operation follows the ***union-by-rank*** strategy. (Ignore the fact that this forest cannot be obtained using this UNION operation when starting from singleton sets.) Answer the following questions, ***continuing at each question from the result of performing the operation of the previous question***:



Question 1: Which element is the parent of element 0 after UNION$(0, 2)$?

A 0 is a root	B 1	C 2	D 3	E another element

Question 2: What is the rank of the tree with element 4 after UNION$(2, 4)$?

A 0	B 1	C 2	D 3	E another value

Question 3: Which element is the parent of element 6 after FIND-SET(6)?

A 6 is a root	B 2	C 4	D 5	E another element

Question 4: What is the rank of the tree with element 8 after FIND-SET(8)?

A 0	B 1	C 2	D 3	E another value