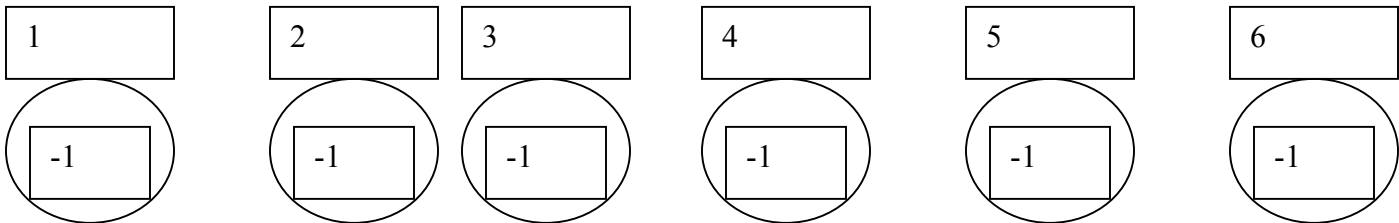


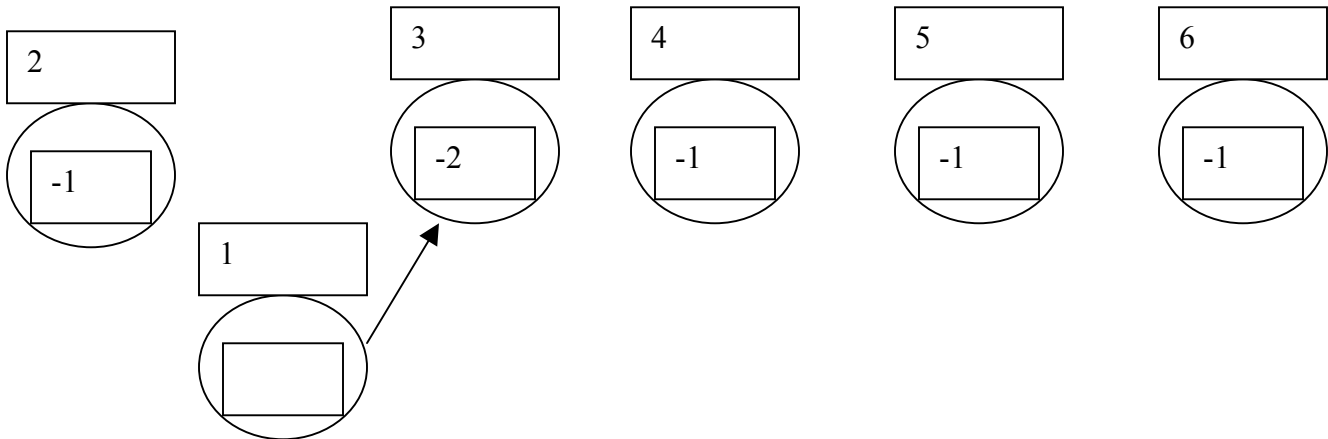
Consider a set $S = \{1, 2, 3, 4, 5, 6\}$ where $S_i = \{i\}$ for $1 \leq i \leq 6$. We want to perform a series of **Union (U)** and **Find (F)** operations:
 $U(1,3), U(4,5), F(2), U(1,2), U(1,6), F(5), U(1,4)$. Discuss an efficient way of doing these operations and mention the time complexity of your algorithm.

SIMULATION

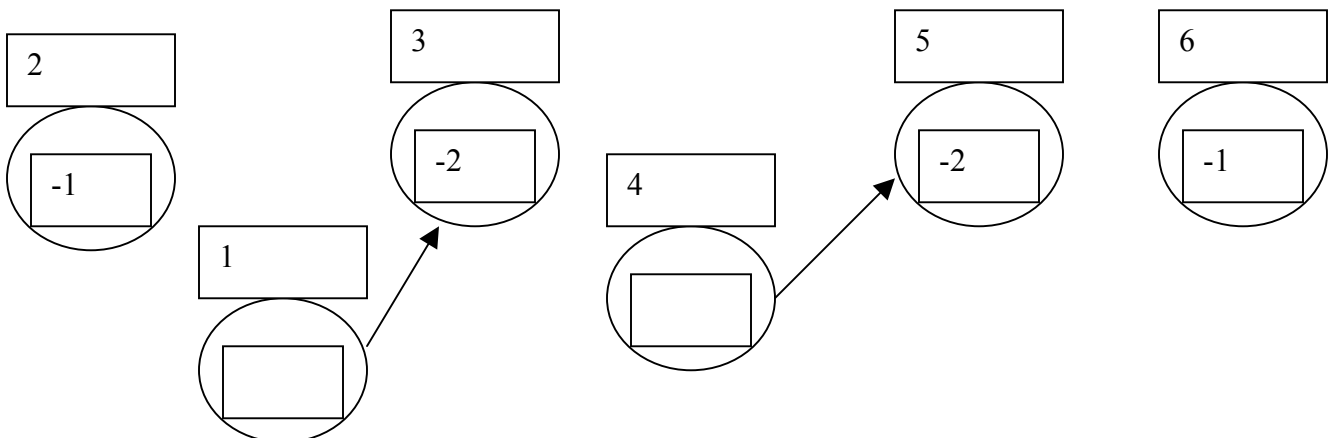
Start with six disjoint subsets.



$U(1,3)$ ----1 and 3 are in sets 1 and 3, and both are singleton sets, so by the weighting rule either can be made the parent of the other.

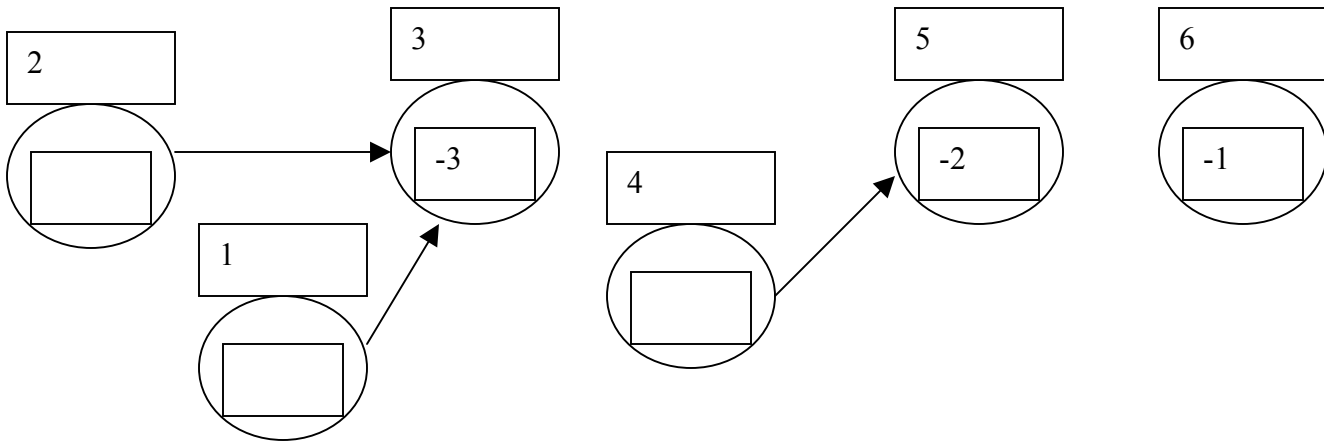


$U(4,5)$ ---4 and 5 are in singleton sets 4 and 5. So we can make either of them the parent of the other.

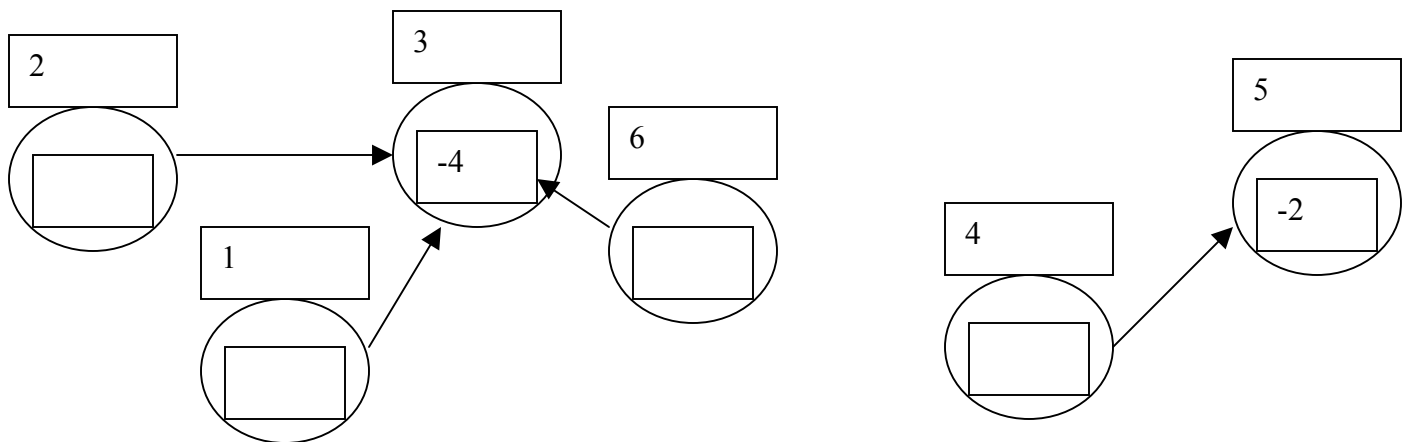


F(2) gives 2 in set number two, no collapsing is involved.

U(1,2)--- 1 is in set no. 3 and 2 is in set no. 2, with 2 and 1 elements respectively. By the weighting rule 3 is made the parent of 2.

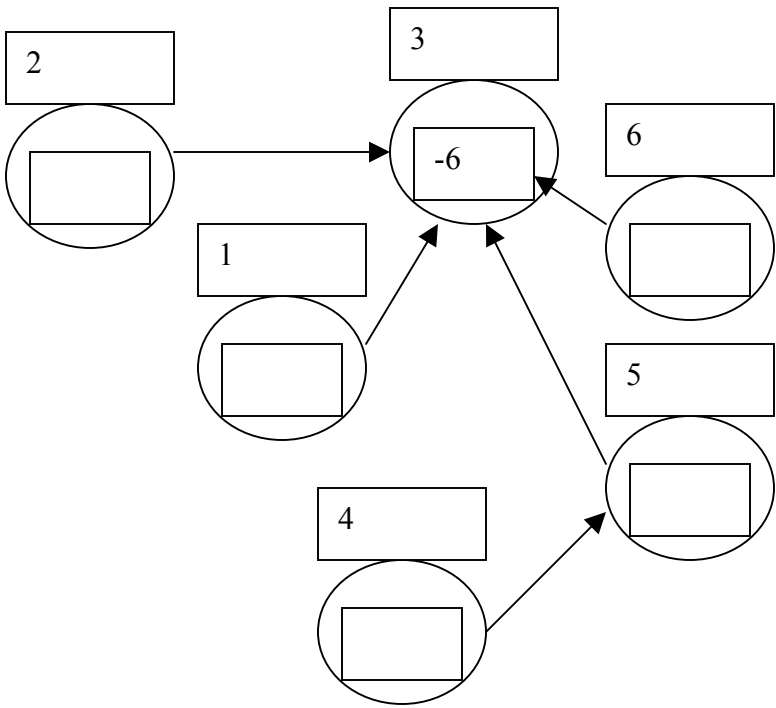


U(1,6)---1 is in set no. 3 which has a cardinality of 3, and 6 is in set 6 with a cardinality of 1. The former is made the parent of the latter.



F(5) --- 5 is in set no. 5 and no collapsing is involved.

U(1,4)---1 is in set no. 3 which has a cardinality of 4, and 4 is in set 5 which has a cardinality of 2. By the weighting rule 3 becomes the parent of 5.



Note:- If we now have $F(4)$ then the collapsing rule applies to the above.