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## DSC 40B - Discussion 01

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### Problem 1.

Modify the `DisjointSetForest` data structure so that it keeps track of the maximum and minimum keys within each disjoint set without adding to the time complexity of any of the operations.

### Problem 2.

The *fractional* knapsack problem is as follows. You have a bag that can hold  $B$  liters. In front of you are  $n$  piles of gold dust, silver dust, etc. The  $i$ th pile contains  $s_i$  liters of dust, and the dust in the pile is worth  $w_i$  dollars in total. You may choose any amount of dust from any pile to put in your bag (up to  $s_i$ ). Your goal is to maximize the value of the dust in your bag.

Describe a greedy algorithm for solving this problem. Is it guaranteed to find the optimal answer?