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Question 1:

Let A be the set containing all the pairs of L_r and L_b from one greedy algorithm, A = {(ar_1,ab_1),(ar_2,ab_2), …, (ar_n,ab_n)}. Also let K the set containing pairs from the optimal solution, K = {(kr_1,kb_1),(kr_2,kb_2), …, (kr_n,kb_n)}

By exchange argument:

If A is not same as K, then here is an (kr_j,kr_b) belongs to K that does not belong to A. Instead A contains (kr_j,$kb_{j'}$) and ($kr_{j''}$,kb_j), such that we have two cases:

1. Difference of (kr_j,kb_j) is greater than or equal to both difference of (kr_j,kb_j) and (kr_j,kb_j), In this case our algorithm is performing better than optimal solution already.
2. Difference of (kr_j,$kb_{j'}$) is less than one of the difference of (kr_j,$kb_{j'}$) and ($kr_{j''}$,kb_j), Lets say (kr_j,kb_j) is less than (kr_j,$kb_{j'}$), then $kb_{j'}$'s pair in K would either
    - Produce a difference greater than (kr_j,$kb_{j'}$) in which case our algorithm's cumulative answer will be less than equal to optimal solution's algorithm.
    - Or $kb_{j'}$'s pair say ($kr_{j'''}$,$kb_{j'}$) in K could be a part of chain such that, $kr_{j'''}$ or any consequent pair in chain if we continue on this sequence would produce a comulative sum of differences greater than or equal to greedy solution.

This proves that greedy approach produces the same result as our optimal solution does.

Took help from friend (batch mate).