Interval scheduling

<http://www.cs.umd.edu/class/fall2017/cmsc451-0101/Lects/lect07-greedy-sched.pdf>

In this proof we assume the existence of multiple optimal solutions and among we choose the one which matches the most with the greedy algorithm and the greedy is not optimal.

We then take the j step where the algorithm doesn’t match with the optimal algorithm. Now the optimal algorithm makes a choice which we know is not equal to the greedy one, but we know by the interval schedule that if it were to take the greedy one, it wouldn’t decrease the quality of the optimal, however it would now have j+1 steps which match with the greedy algorithm and that contradicts the fact that this is the solution that matches max with the greedy algorithm. In a way we just created another solution that is equal in quality to the optimal but has more matching than the present one.

By now applying induction onto this we can see that the optimal solution will turn out to be the greedy one and hence prove that the greedy solution is in fact the optimal solution.

**Note – such a way of argument Is called the Greedy algorithm stays ahead. Show that after each step of the greedy algorithm, its solution is at least as good as any other algorithm′s**.