UNIVERSITY OF WASHINGTON

CSE417 HW#3
Part I, problem 1 & 2

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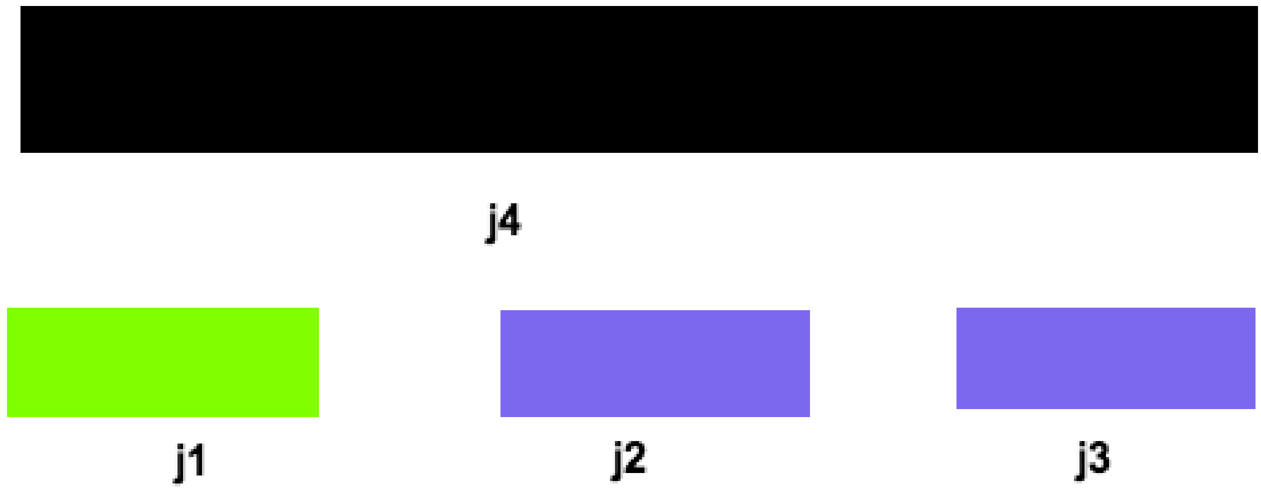
1 PROBLEM #1

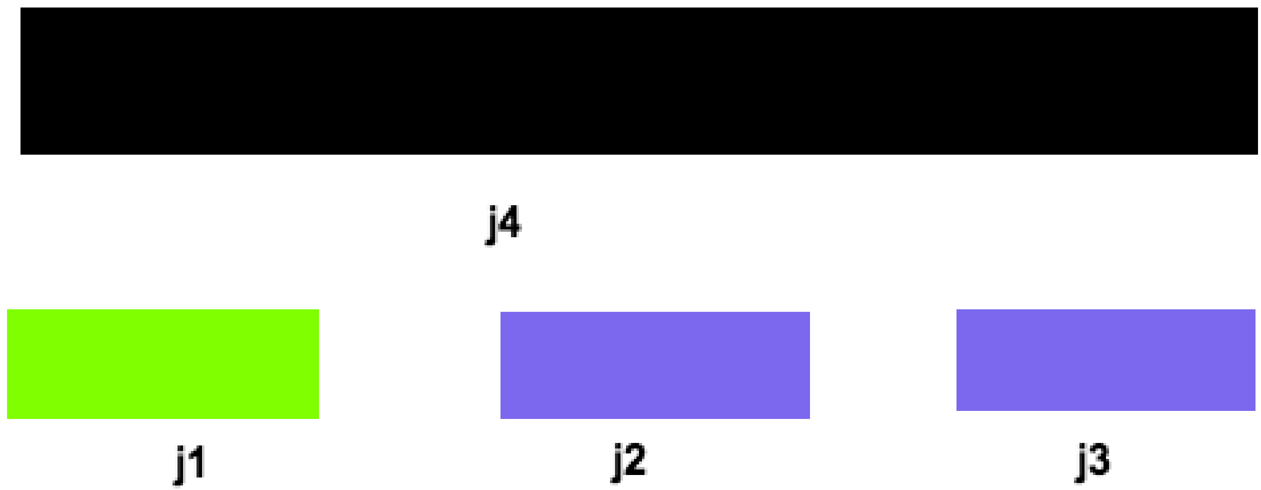
Suppose that there are four job:

JOB NO	STARTS	ENDS
j1	8:30	9:30
j2	9:40	10:40
j3	10:50	11:50
j4	8:30	11:50

By Using the algorthm from spec, j1 will be assign a color first since it has the earliest finish time, then j4 will be assign another color, since j4 is conflict with j1, Finially, j2 and j3 are assigned the same color, because there are not conflictto each other. Result:



which requires 3 resources, however, the optimal result uses only 2 resource, since j1, j2 and j3 can be assigned to the same color (not conflit to each other) Optimal Result:



2 PROBLEM #2

ALGORITHM:

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Global initialization: houseList = [houses sorted from east to west], count = 0

While houseList is not empty:
    Choose the first house H from houseList
    Set a phone station S four miles away from H to the west
    Remove all houses covered by S from houseList
    count++
EndWhile
Return count;
```

PROOF:

So let S = {s1,s2, ..., sk} denotes set of base stations placed by our greedy algorithm, Let T = {t1,t2, ..., tm} denotes set of base stations placed by optimal solution, if k=m, then the above algorithm is optimal Showing a sense in which our greedy solution S stays ahead of optimal solution T. Specifically claim that si>t i for each i and prove this by induction. The claim is true for i=1, since we go as far as possible to the east before placing the first base station. Assume now it is true for some value i>=1, this means that our algorithm is first I centers {s1,s2, ..., sk} cover all the houses covered by the first i centers {t1,t2, ..., ti}. As a result, if we add ti+1 to {s1,s2, ..., sk}, we will not leave any house between si and ti+1 uncovered. But the (i+1) st step of the greedy algo chooses si+1 to be as large as possible subject to the condition of covering all houses between si and si+1; so we have si+1>i i+1. This proves the claim by induction. Finally if k>m then {s1,s2, ..., sk} fails to cover all houses. But sm>= tm, and so {t1,t2, ..., tm} = T also fails to cover all houses, a contradiction.