CS21003 ALGORITHMS-1
(WorkSheet 6)
Date: Oct 31 2020

1 Write a greedy algorithm to solve the following problem. Explain each step and compute the time complexity.

Let us consider a refrigerator servicing facility that can handle just one refrigerator at a time. Suppose that on a particular day there are n refrigerators awaiting repair. Arrival of refrigerator i is specified by an earliest start time s_i, and a processing time p_i. We consider that at any time repairing of a refrigerator can be suspended and then completed later.
For example if $n = 2$ and the input is $s_1 = 2$, $p_1 = 5$ and $s_2 = 0$, $p_2 = 3$, then a possible schedule is:

- refrigerator 2 is repaired from time 0 to 2 and is then suspended.
- refrigerator 1 is repaired from time 2 to 7, and
- refrigerator 2 is completed from time 7 to 8.

The goal is to output a schedule that minimizes

$$\sum_{j=1}^{n} C_j$$

where C_j is the time when the repairing of refrigerator j is completed.

For instance, in the example schedule given above, $C_1 = 7$ and $C_2 = 8$. Thus, $\sum_{j=1}^{n} C_j = 15$. But is this the best you can do? We can actually process refrigerator 2 fully ($C_2 = 3$) and then go to refrigerator 1 ($C_1 = 8$), giving a lower value of $\sum_{j=1}^{n} C_j = 11$ (optimal solution).

Provide a greedy algorithm to compute an optimal schedule. What is the complexity of your algorithm?