Activity selection problem / maximum disjoint interval

You are given **n** activities with their start and finish times. Select the maximum number of activities that can be performed by a single person, assuming that a person can only work on a single activity at a time.
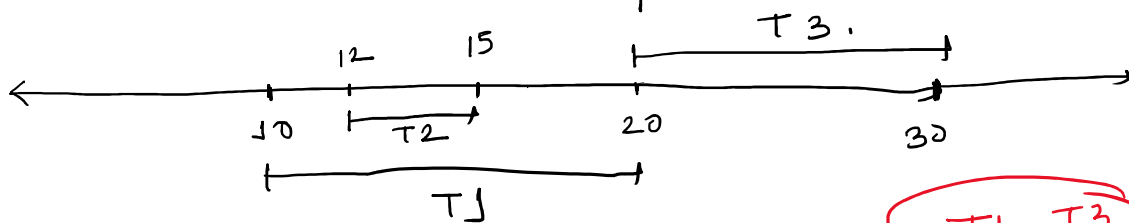
Task	Start Time	End Time
1	10	20
2	12	15
3	20	30

Eg.

$8 - 9 \rightarrow$ DSA class.

$8:30 - 9:30 \rightarrow$ ML

Ans=

T1, T3 — 2
T2, T3

Start Time (s)	Finish Time (f)	Task Name
5	9	T1
1	2	T2
3	4	T3
0	6	T4
5	7	T5
8	9	T6

T4, T6 → 2

T2, T3, T1 → 3 activities

T2, T3, T5, T6 → 4 activities
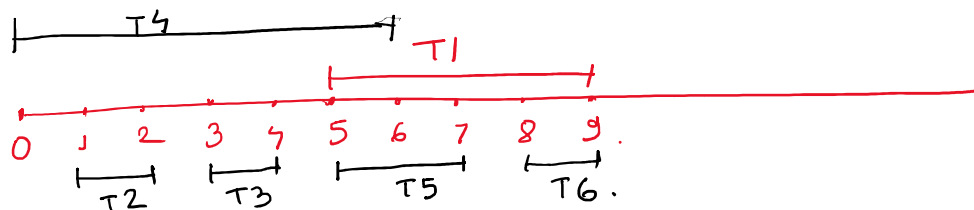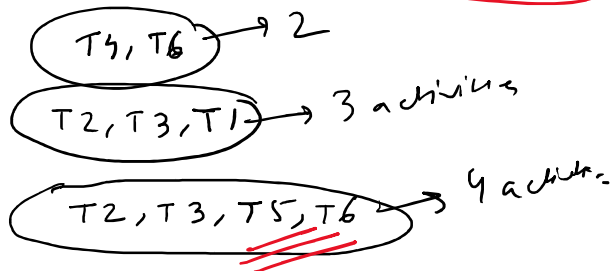
Algorithm:
1. Sort all activities based on their finish time.
2. Choosing the first activity from the sorted list.
3. Select the next activity from the sorted list only if its `start` time is greater than or equal to the `finish` time of the previously selected activity.
4. Repeat `Step 3` for all the remaining activities in the sorted list.

Question: Maximum tasks that can be performed without any overlapping

Start Time (s)	Finish Time (f)	Task Name
5	9	T1
1	2	T2
3	4	T3
0	6	T4
5	7	T5
8	9	T6

0	6	14
5	7	T5
8	9	T6

Answer:

1. Sort all activities based on their finish time.

Start Time (s)	Finish Time (f)	Task Name
~~1~~ 3	~~2~~ 4	~~2~~ 3 T
~~3~~ 0	~~4~~ 6	~~3~~ 4 T
5	7	~~4~~ 5 T
5	9	~~5~~ 1 T
8	9	~~1~~ 6 T

Surely

$$T2 \longrightarrow \quad FT$$
$$T2 \longrightarrow \quad 2.$$
$$T3 \longrightarrow \quad 4.$$
$$T5 \longrightarrow \quad 7.$$
$$T6 \longrightarrow \quad 9.$$

④   T2 T3 T5 T6

Spanning Tree — $g(N, E)$

$\downarrow$

Spanning Tree — $g'(N, N-1)$