Lecture 30

CSE 331

Nov 13, 2023

HW 6 Q1+2 templates buggy

question @461

stop following

32 views

Actions

Question of subsections in LaTeX

It seems that Collaborator and Sources have disappeared from latex template since HW5. Even though I can type them by myself, may I ask that is there any chance we'll see them back in the rest of HWs (I'm a bit lazy)?

Thank you!

(*Making this public. --Atri*)

homework6

~ An instructor (Atri Rudra) endorsed this question ~

Reflections 1+2 grading

note @466

stop following 16 views

Actions

Reflections 1+2 grading timeline

I'll be grading all the reflections for the project.

I'm hoping to get both the reflections graded in 1-2 weeks time but in the worst-case I'll get them done around a week before reflections 3 is done (so worst-case a day or two after the Thanksgiving break).

project

Edit good note | 1

Updated 3 minutes ago by Atri Rudra

Final exam conflict

note @447

stop following 19 views

Actions

Final exam conflicts

I know some of you have an exam conflict with CSE 331 final exam. Since I'm not sure if I know the exact set of students with conflict, I figured I'll do a piazza post.

If you have an exam conflict with the CSE 331 final please EMAIL me by 5pm on Friday, Nov 17. If you email me after this deadline, I cannot promise to be able to give you a makeup option that works with your schedule.

Please note that the makeup final will be on *Tuesday, Dec 12* (i.e. a day before the scheduled final exam). My goal is to pick a time that works for everyone on Dec 12.

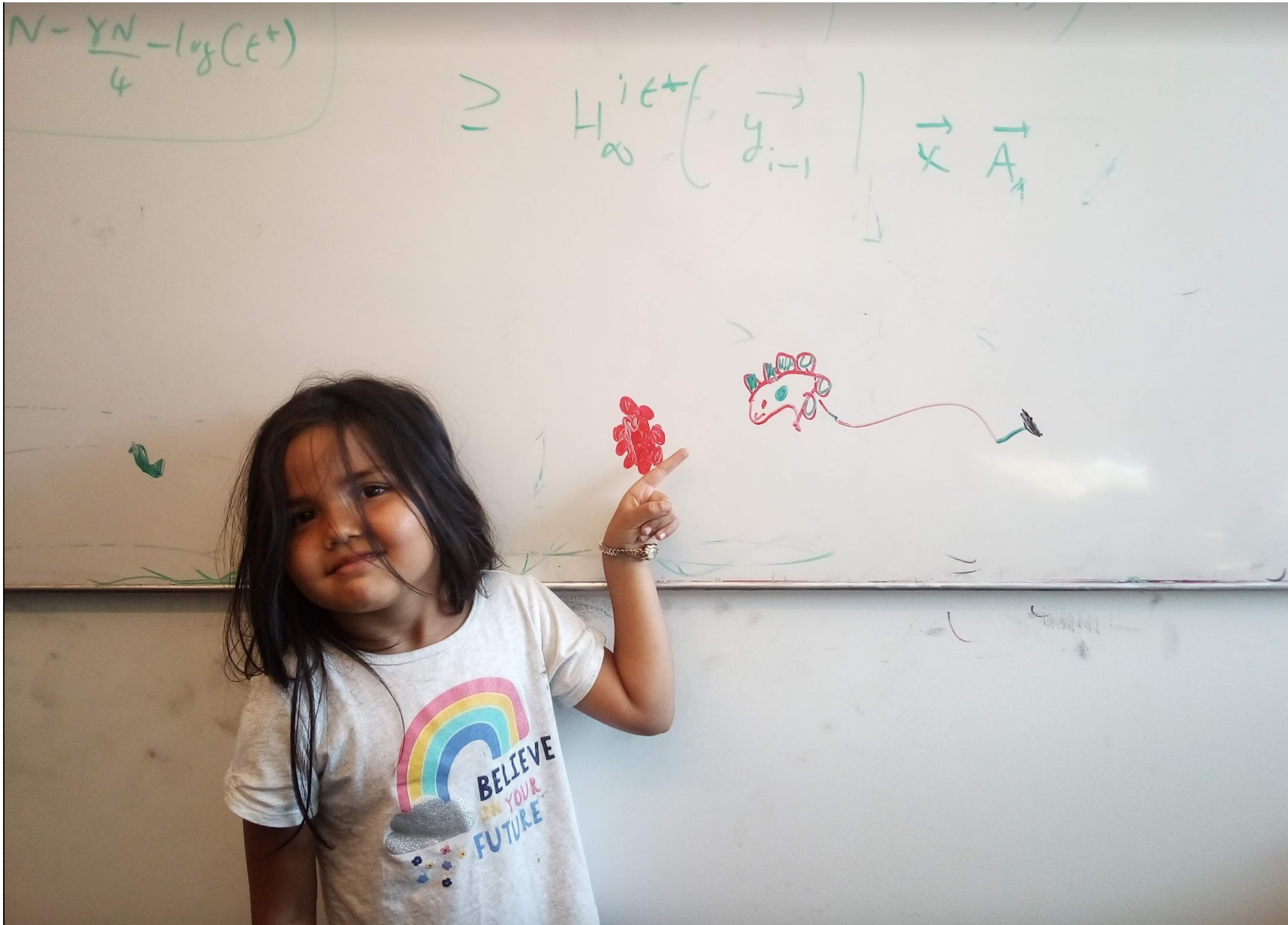
So *if you email me for a makeup final exam*, please send me all the time(s) that you do a makeup on Tuesday, Dec 12 between 9am-5pm.

final

Edit good note | 1

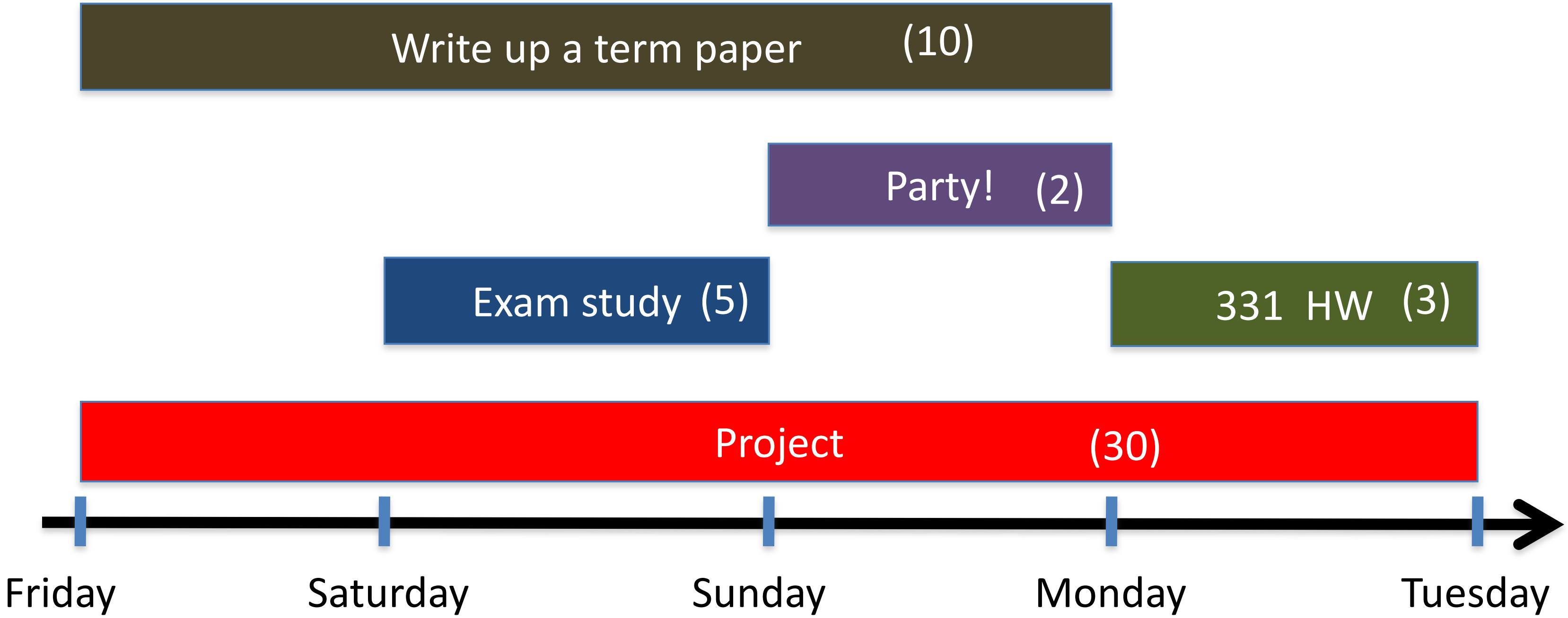
Updated 60 minutes ago by Atri Rudra

Questions/Comments?



End of Semester blues

Can only do one thing at any day: what is the optimal schedule to obtain maximum value?



Previous Greedy algorithm

Order by end time and pick jobs greedily

Greedy value = 5+2+3= 10

Write up a term paper (10)

Party! (2)

Exam study (5)

331 HW (3)

OPT = 30

Project (30)

Friday Saturday Sunday Monday Tuesday

Weighted Interval Scheduling

Input: n jobs (s_i, f_i, v_i)

Output: A schedule S s.t. no two jobs in S have a conflict

Goal: max $\Sigma_{i \text{ in } S}\, v_j$

Assume: jobs are sorted by their finish time

Today's agenda

Finish designing a recursive algorithm for the problem

Couple more definitions

p(j) = largest i < j s.t. i does not conflict with j

= 0 if no such i exists

p(j) < j

OPT(j) = optimal value on instance 1,..,j

Moving to the board…

Property of OPT

j in OPT(j)

j not in OPT(j)

$$OPT(j) = \max \{ v_j + OPT(\, p(j)\,),\ OPT(j-1) \}$$

Given OPT(1),…., OPT(j-1),
how can one figure out if j
in optimal solution or not?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A recursive algorithm

Proof of correctness by induction on j

Compute-Opt(j)

Correct for $j=0$

If $j = 0$ then return 0

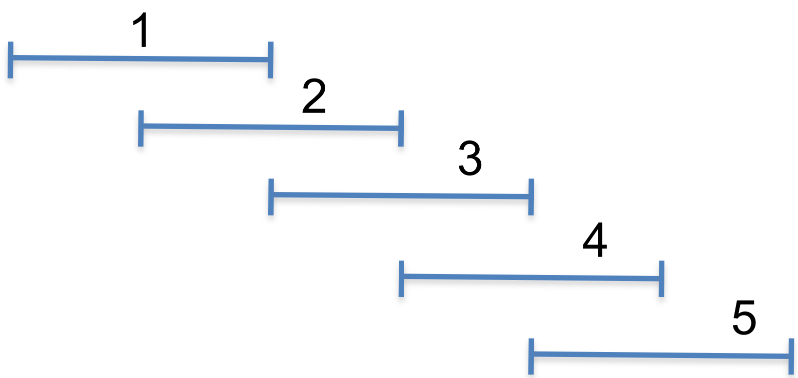
return max { v_j + Compute-Opt($p(j)$), Compute-Opt($j-1$) }

$= OPT(p(j))$

$= OPT(j-1)$

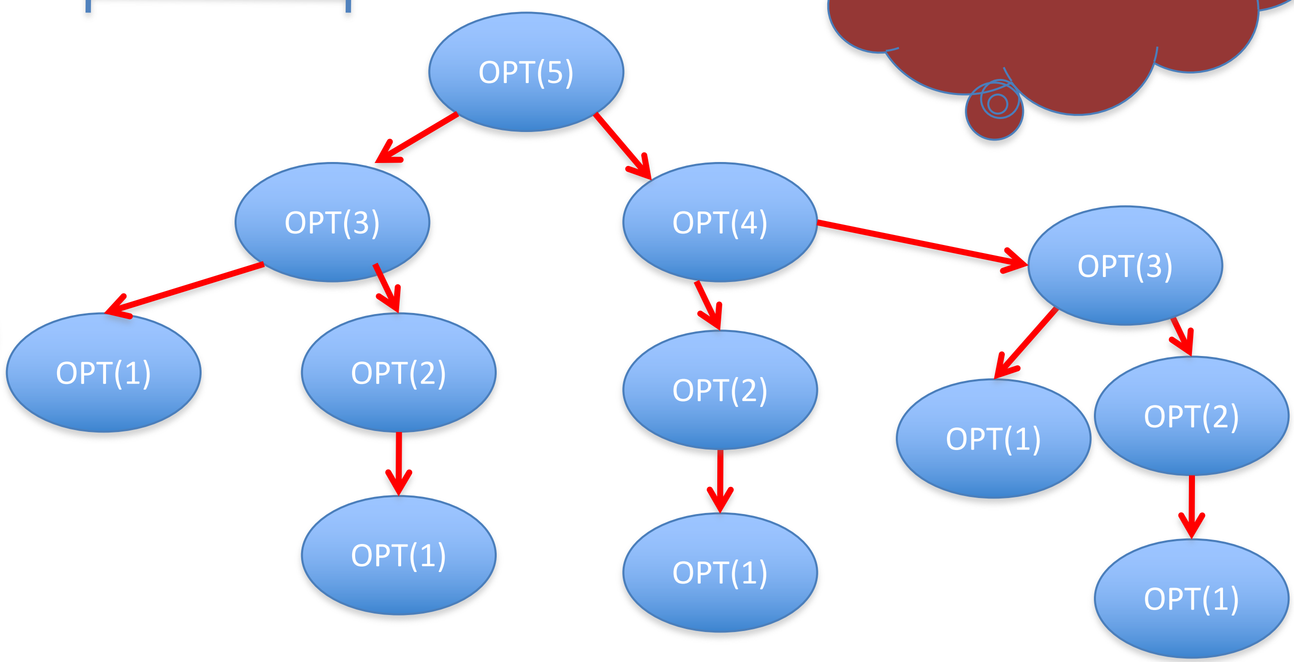
$$OPT(j) = \max \{ v_j + OPT(p(j)), OPT(j-1) \}$$

Exponential Running Time



p(j) = j-2

Only 5 OPT values!



Formal proof: Ex.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Using Memory to be smarter

Using more space can reduce runtime!

How many distinct OPT values?

A recursive algorithm

M-Compute-Opt(j)

M-Compute-Opt(j)
= OPT(j)

If j = 0 then return 0

If M[j] is not null then return M[j]

M[j] = max { v_j + M-Compute-Opt(p(j)), M-Compute-Opt(j-1) }

return M[j]

Run time = O(# recursive calls)