Lecture 28

CSE 331

Nov 4, 2019

Survey due by 11am Wed

Submitting the survey

The peer evaluation survey will have to be filled on https://cse.buffalo.edu/teamwork. You will evaluate yourself and your groupmates in all the five categories.

The workflow

1. Between **12:00pm on Monday Nov 4** and **10:59apm on Wednesday Nov 6** the website above will be ready for you.
2. You will need to enter your UB email and click on a button to generate a verification code.
3. You will have limited time (~10 mins) to enter the verification code into the webage.
4. You will then fill in the survey: the website will ask you to evaluate yourself and your groupmates in all the five categories above.
5. Your part is done. Atri will use your survey responses and your video submission to post your video mini-project scores on Autolab (the scores will be posted on your video submission).

UB CSE Evaluation Form

Please enter your UB email address! You'll then receive a verification code you can type in further down the page.

ubitname@buffalo.edu

Get Verification Code

Already have valid code?

Problem 4 on Mini Project

note

stop following 7 views

Problem 4 on Coding Project is now live!

As promised in @1114, Autolab is now accepting submissions for Problem 4 for the coding project. The coding project webpage has been updated with the required coding details:

http://www-student.cse.buffalo.edu/~atri/cse331/fall19/coding-project/index.html

Few things to keep in mind:

- As with problem 1 (@801), 2 (@980) and 3 (@1114) this is group submission-- please see the webpage for instructions on how to do so. *Please follow the instructions EXACTLY. Not following the instructions might make the group submission on Autolab not behave as intended.*
- You have to form your group **AGAIN** for Problem 4 on Autolab-- it unfortunately does not carry over from Problem 1 or Problem 2 or Problem 3.
- **Please download the zip for Problem 4 and use that for Problem 4 submission.** In particular, do NOT use the zip for Problem 1 or 2 or 3 for Problem 4.
- Problems 5 should be up by end of this week.

If you have questions, please post on piazza! Or go to office hours. Have fun :-)
#pin

coding_mini_project

edit · good note | 0

Updated 26 seconds ago by Atri Rudra

Changes in TA office hours

note

stop following 61 views

TA office hour changes

The following changes are **effective immediately** (i.e. Monday onwards) **for the rest of the semester**:

- We will not be having any 1-on-1 appointments anymore. Essentially none of you were making use of this and it seemed like a waste to have those. So going forward all office hours will be drop ins.
- Veronica's Tuesdays 5-5:50pm office hours are canceled. Going forward she will only have OHs on Wednesdays 5-5:50pm.

The changes above have been made on the course webpage as well as the course calendar.

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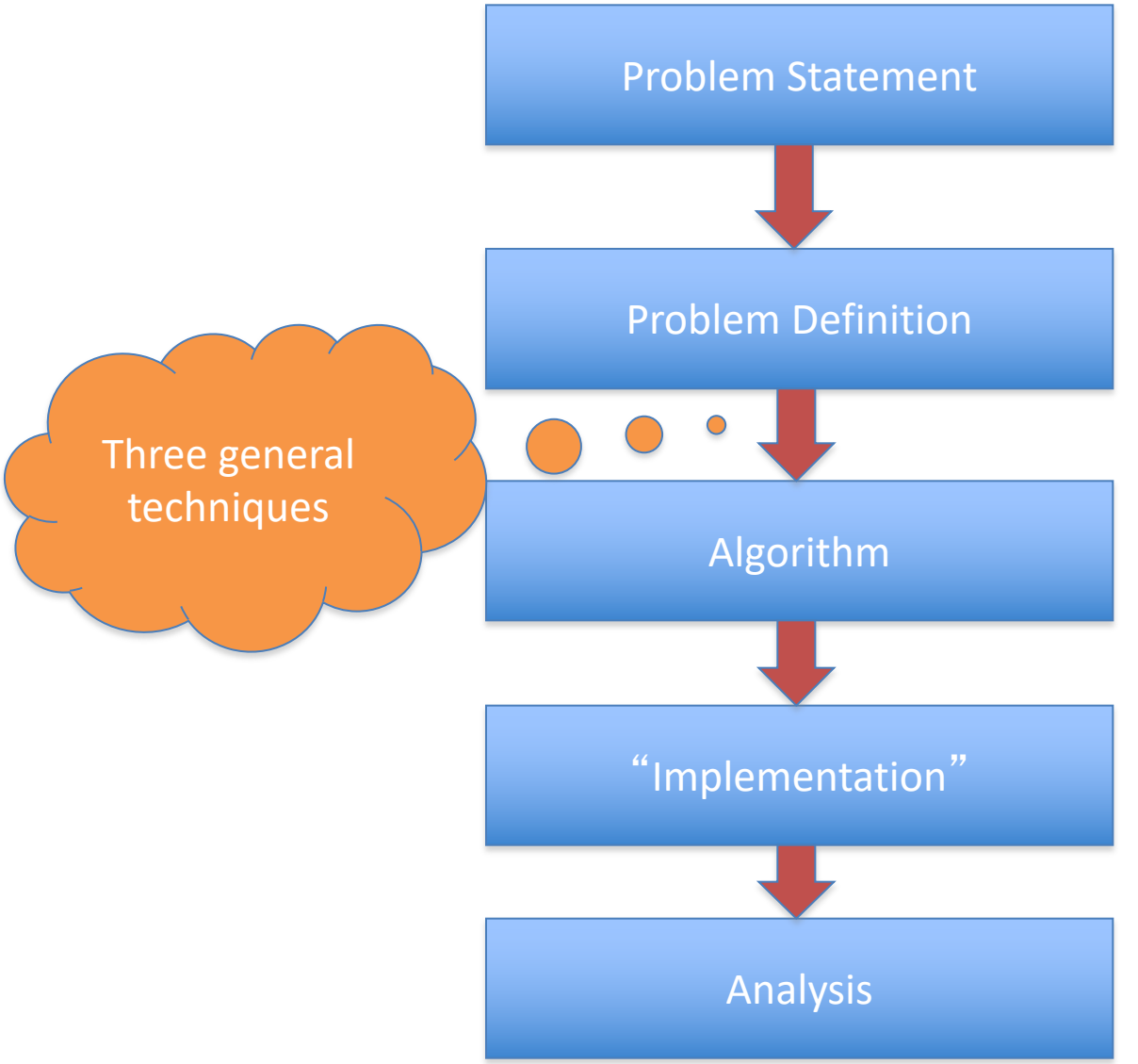
office_hours

edit · good note | 0

Updated 2 days ago by Atri Rudra

Questions?

High level view of CSE 331

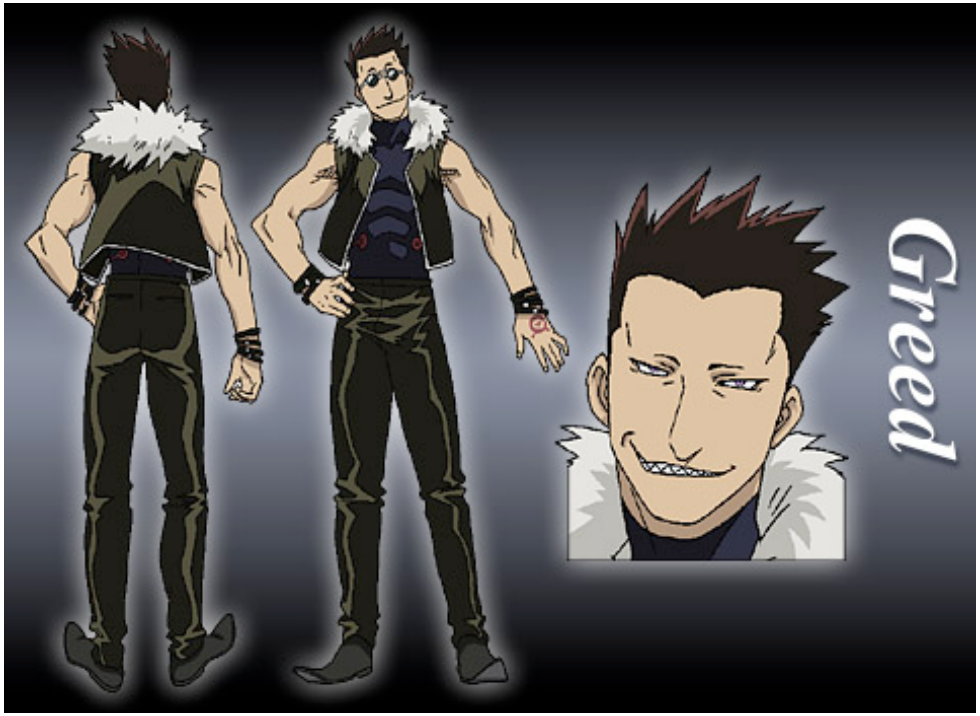


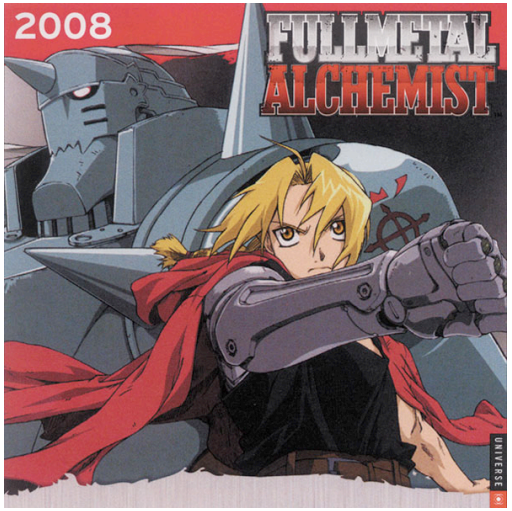
Data Structures

Correctness+Runtime Analysis

Greedy Algorithms

Natural algorithms





Reduced exponential running time to polynomial

Divide and Conquer

Recursive algorithmic paradigm

Reduced large polynomial time to smaller polynomial time

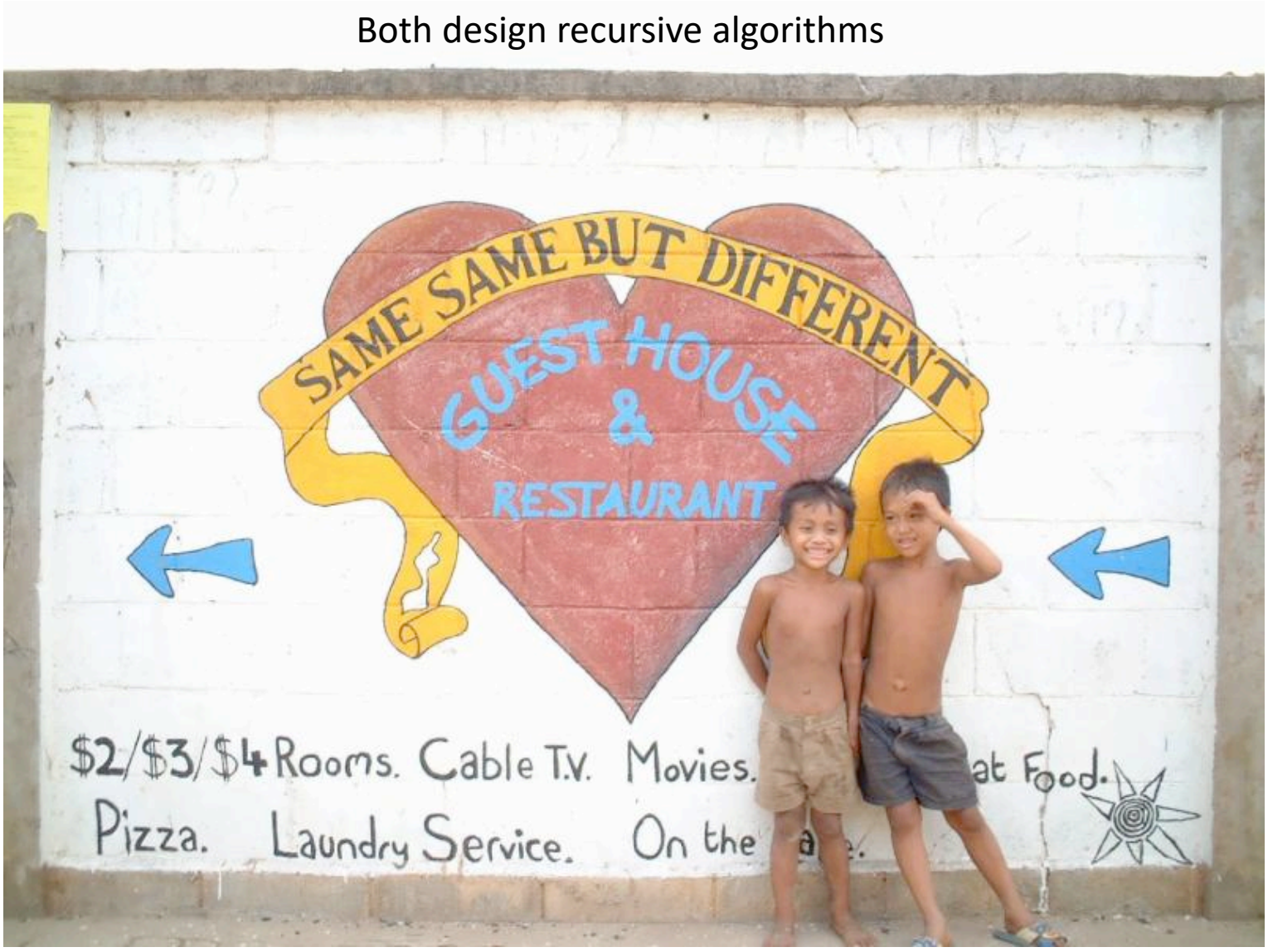
A new algorithmic technique

Dynamic Programming

Dynamic programming vs. Divide & Conquer

Same same because

Both design recursive algorithms

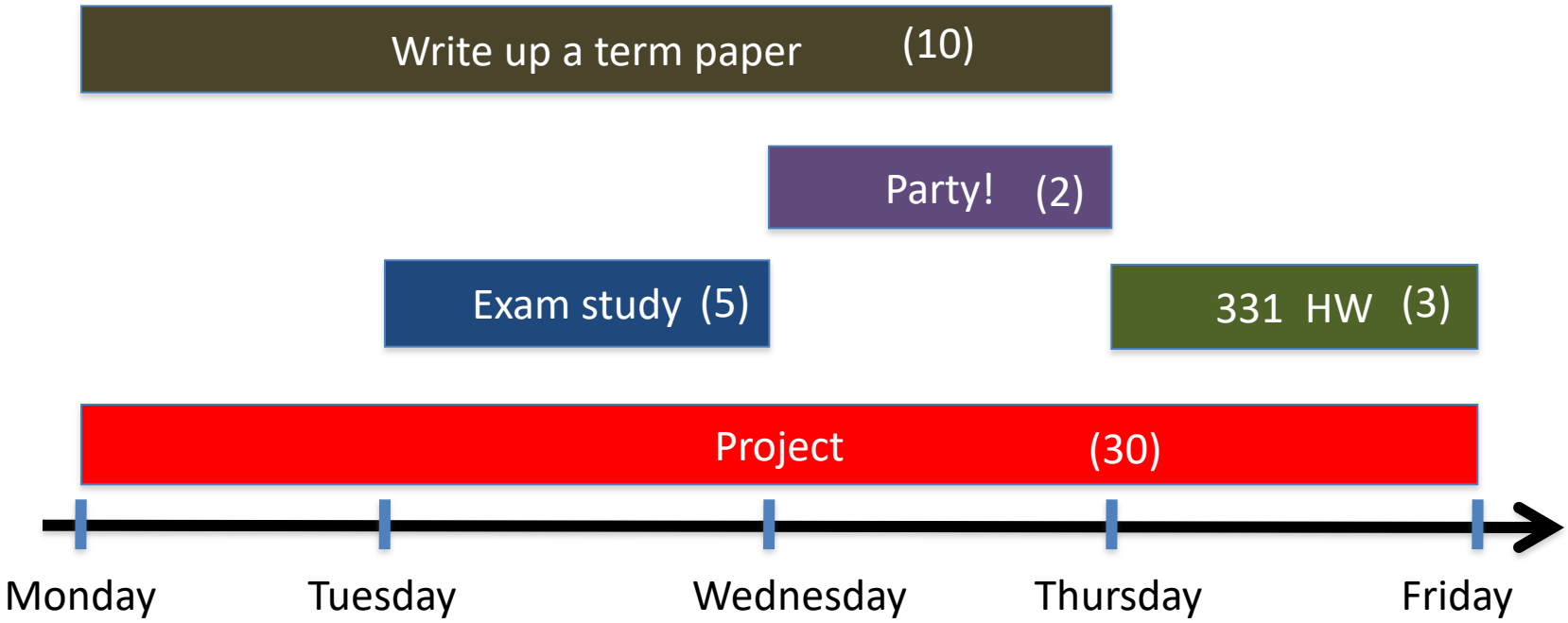


Different because

Dynamic programming is smarter about solving recursive sub-problems

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)

Monday Tuesday Wednesday Thursday Friday

Today's agenda

Formal definition of the problem

Start designing a recursive algorithm for the problem

Weighted Interval Scheduling

Input: n jobs/intervals. Interval i is triple (s_i, f_i, v_i)

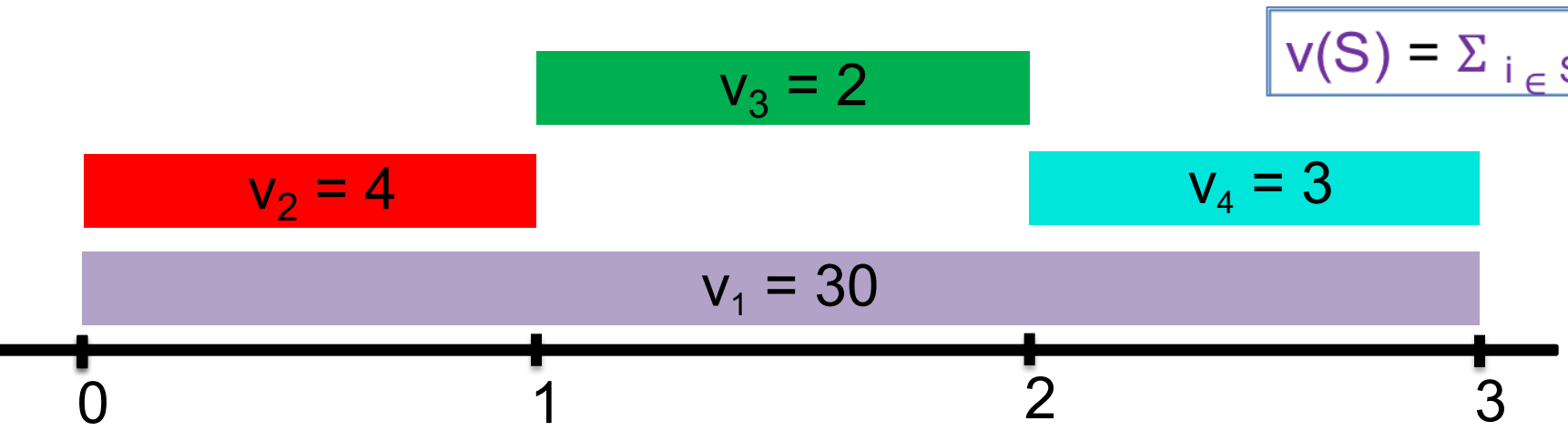
start time

finish time

value

Output: A valid schedule $S \subseteq [n]$ that maximizes $v(S)$

$v(S) = \Sigma_{i \in S} v_i$



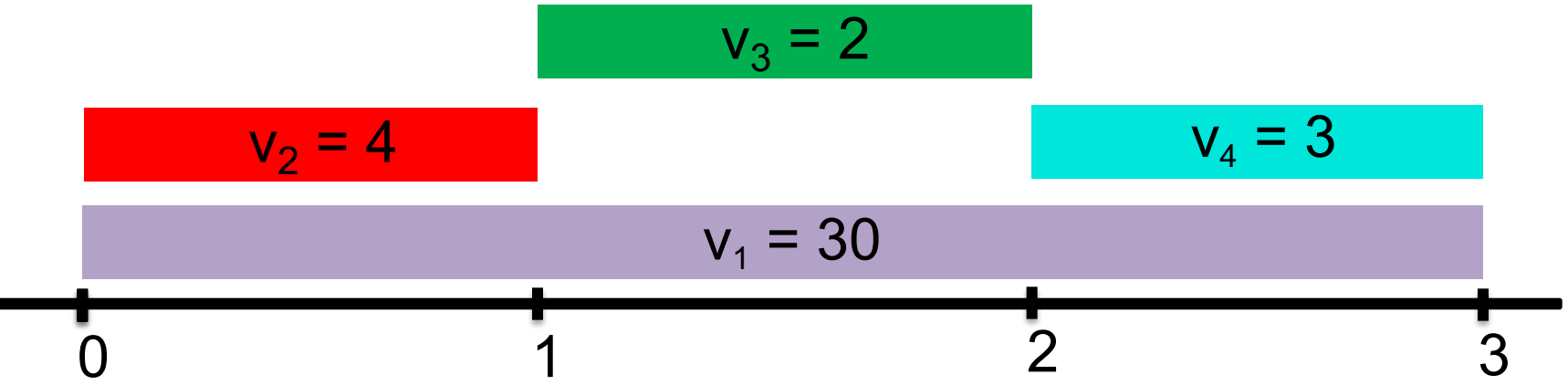
Previous Greedy Algorithm

R = original set of jobs

S = ϕ

While R is not empty
    Choose i in R where f_i is the smallest
    Add i to S
    Remove all requests that conflict with i from R

Return S* = S



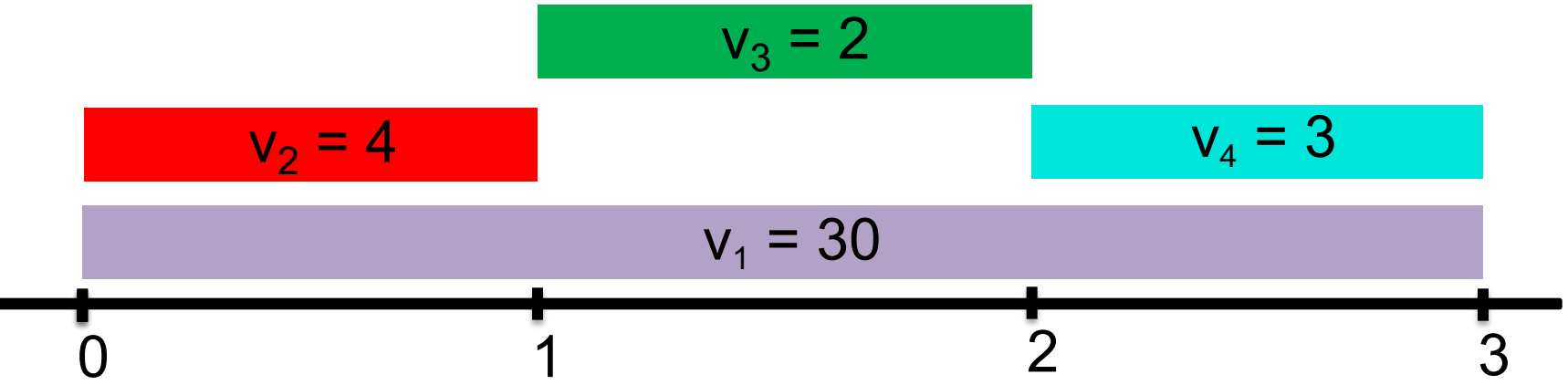
Perhaps be greedy differently?

R = original set of jobs

S = ϕ

While R is not empty
  Choose i in R where $v_i/(f_i - s_i)$ is the largest
  Add i to S
  Remove all requests that conflict with i from R

Return S* = S



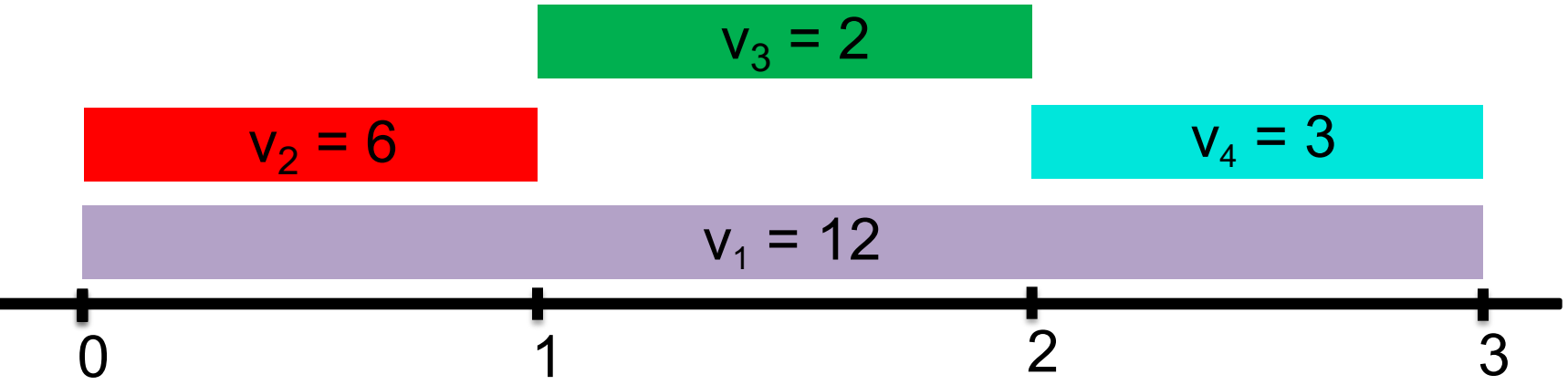
Can this work?

R = original set of jobs

S = ϕ

While R is not empty
    Choose i in R where $v_i/(f_i - s_i)$ is the largest
    Add i to S
    Remove all requests that conflict with i from R

Return S* = S



Avoiding the greedy rabbit hole

https://www.writerightwords.com/down-the-rabbit-hole/

Provably IMPOSSIBLE for a large class of greedy algos

There are no known greedy algorithm to solve this problem

Perhaps a divide & conquer algo?

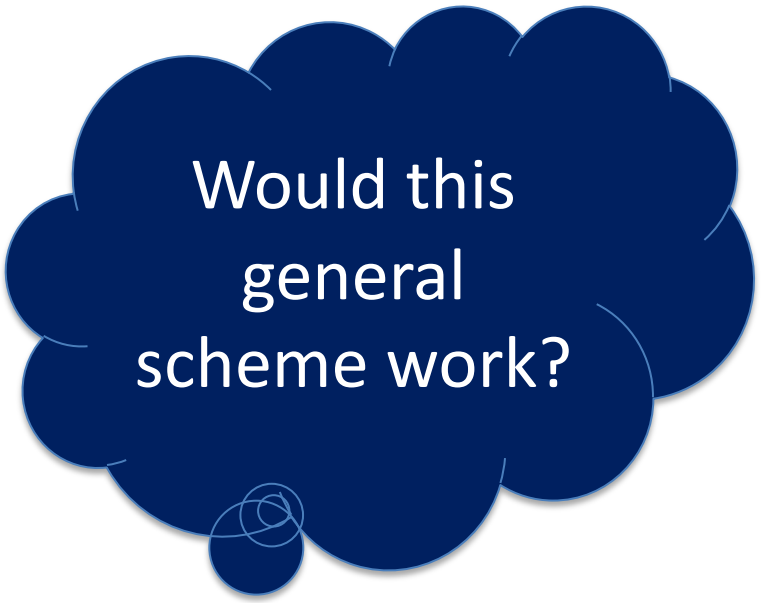
Divide the problem in 2 or more many EQUAL SIZED INDEPENDENT problems

Recursively solve the sub-problems

Patchup the SOLUTIONS to the sub-problems

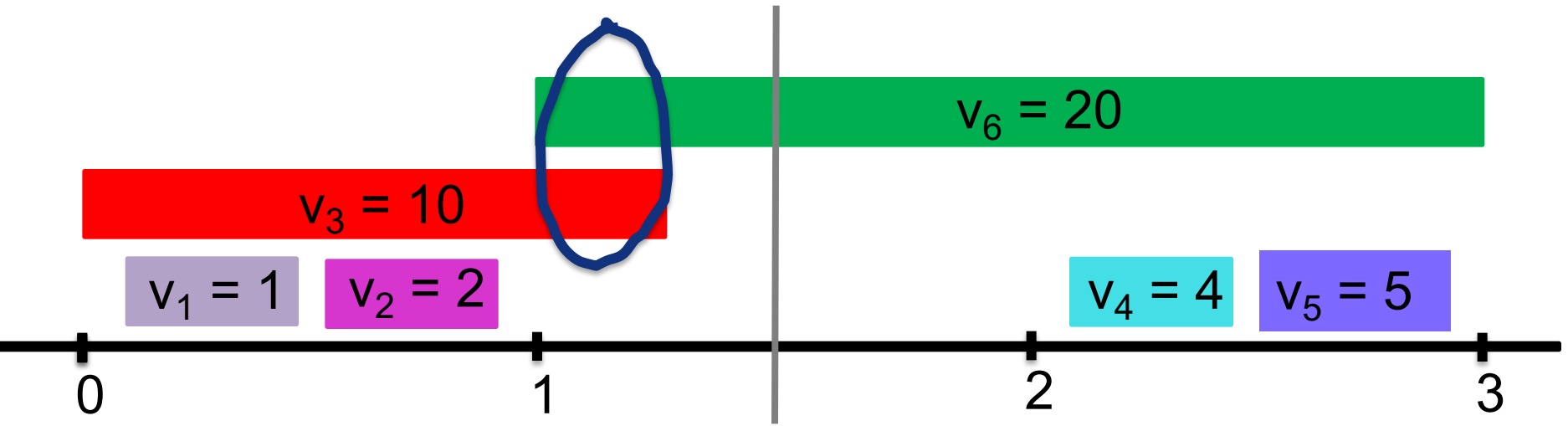
Perhaps a divide & conquer algo?

```
RecurWeightedInt([n])

    if n = 1 return the only interval

    L = first n/2 intervals
    R = last n/2 intervals

    S_L = RecurWeightedInt(L)

    S_R = RecurWeightedInt(R)

    PatchUp(S_L, S_R)
```



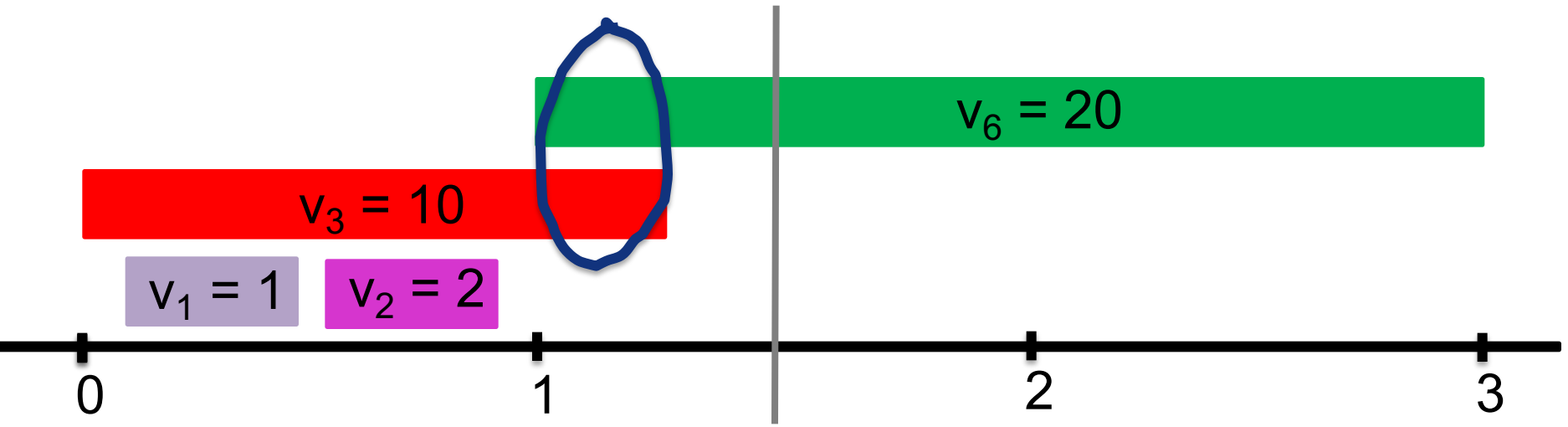
Divide the problem in 2 or more many EQUAL SIZED INDEPENDENT problems

Sub-problems NOT independent!

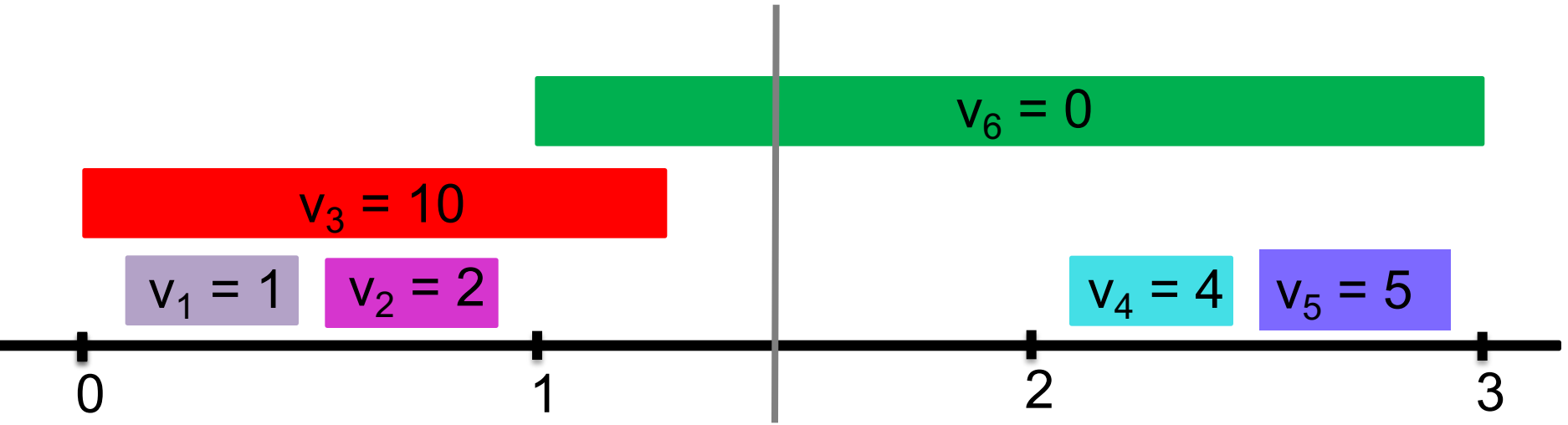


Perhaps patchup can help?

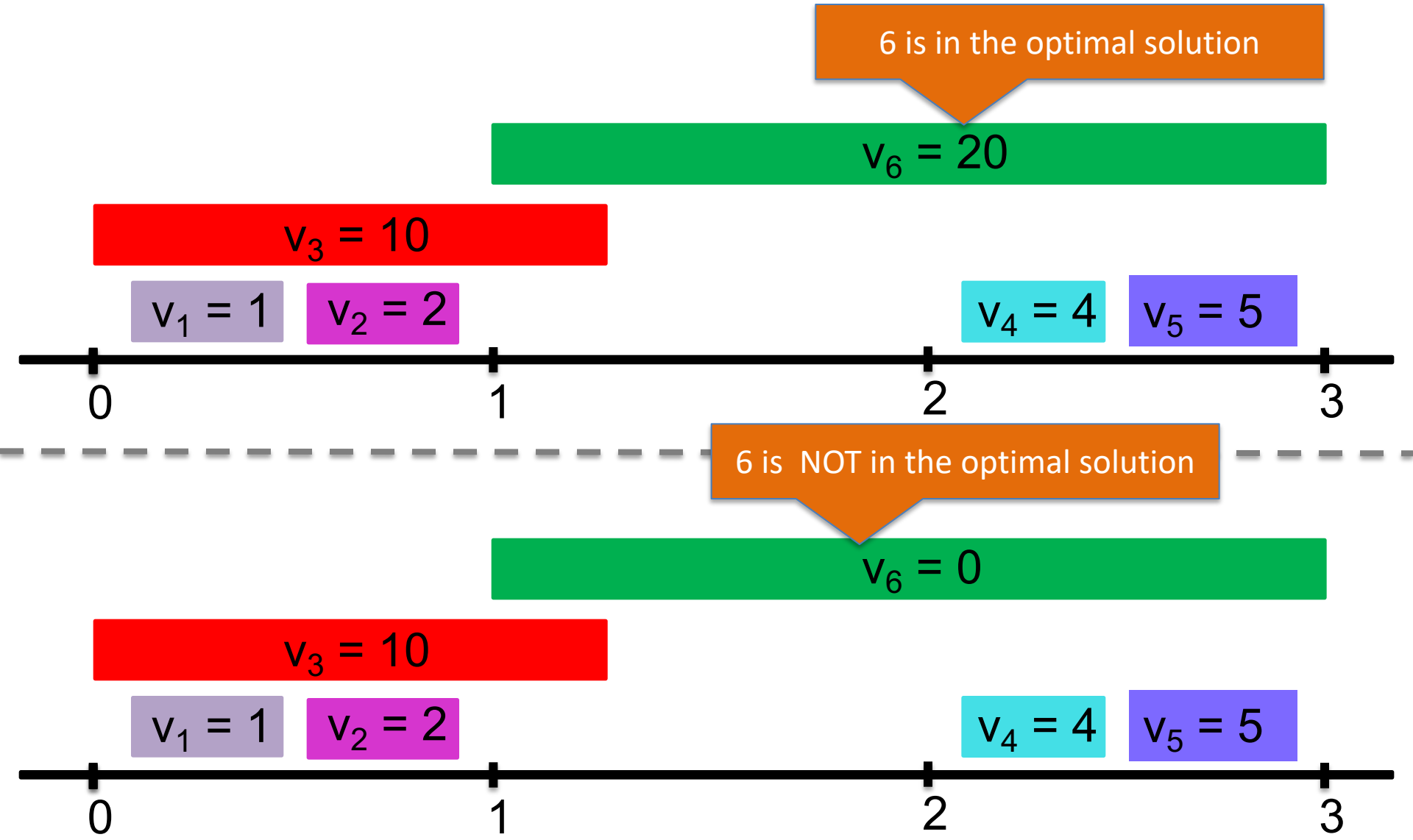
Patchup the SOLUTIONS to the sub-problems



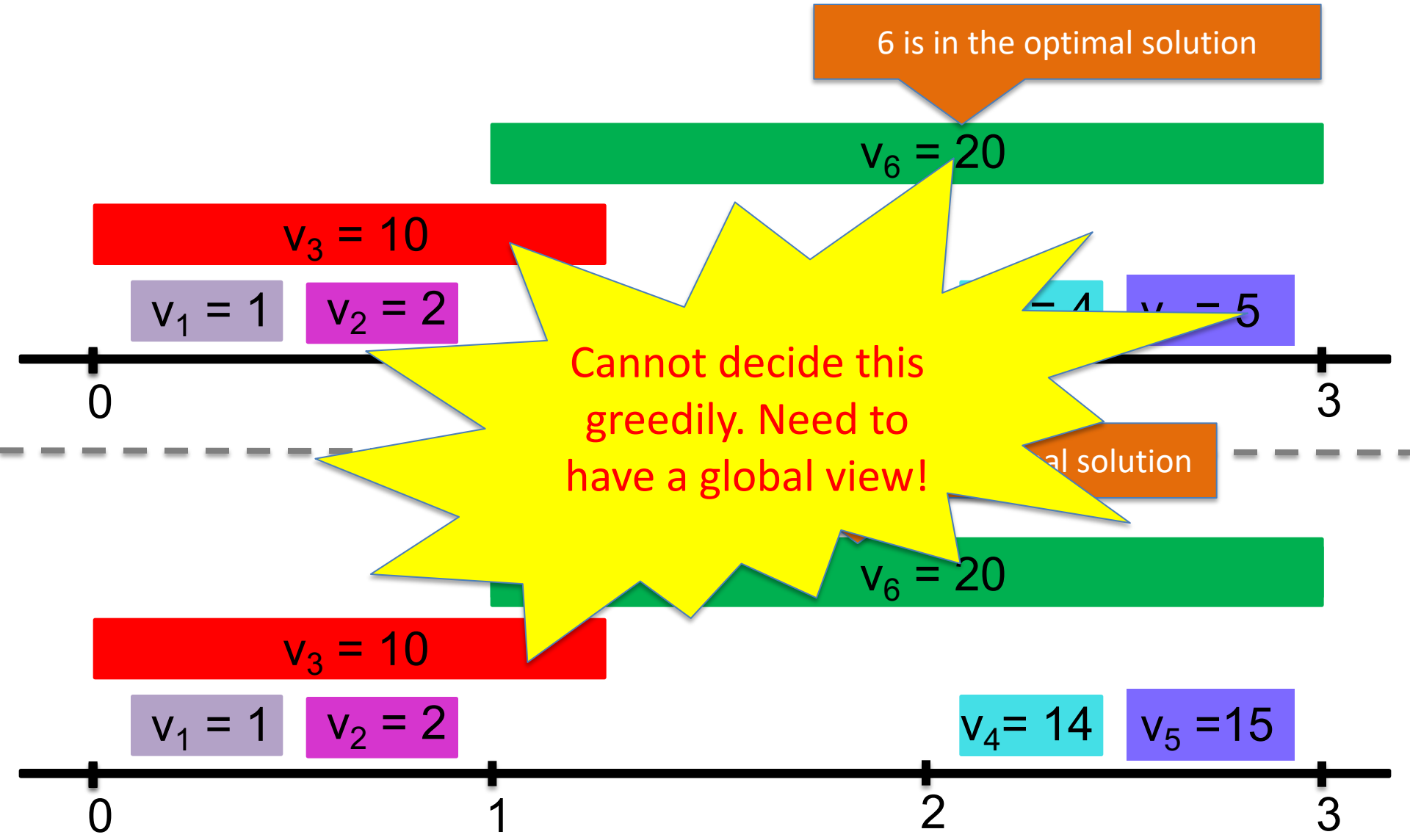
Sometimes patchup NOT needed!



Check for two cases?



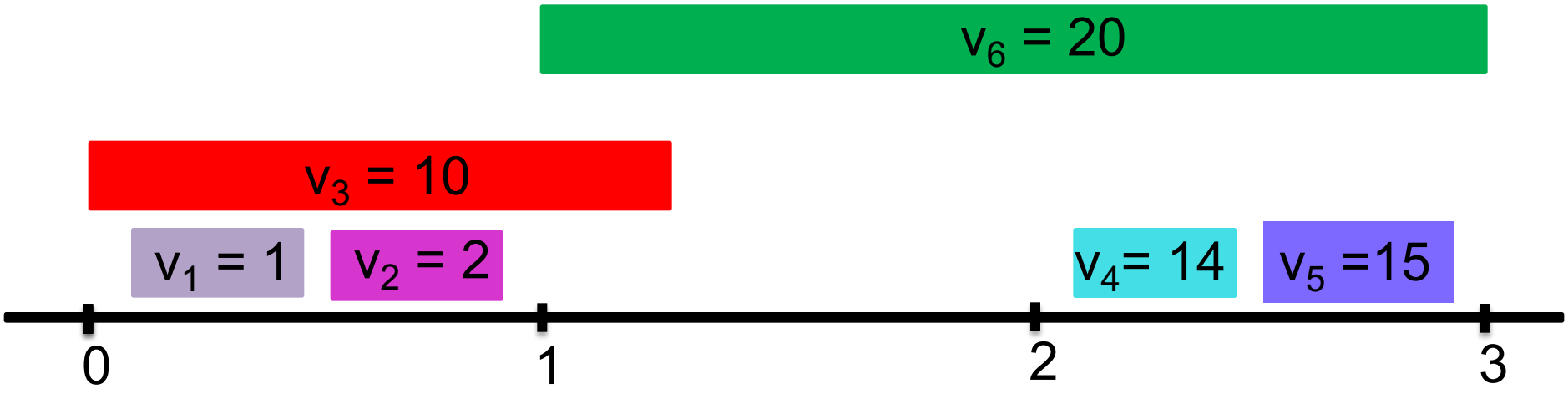
Check if v_6 is the largest value?



Check out both options!

Case 1: 6 is in the optimal solution

6 is not in optimal solution

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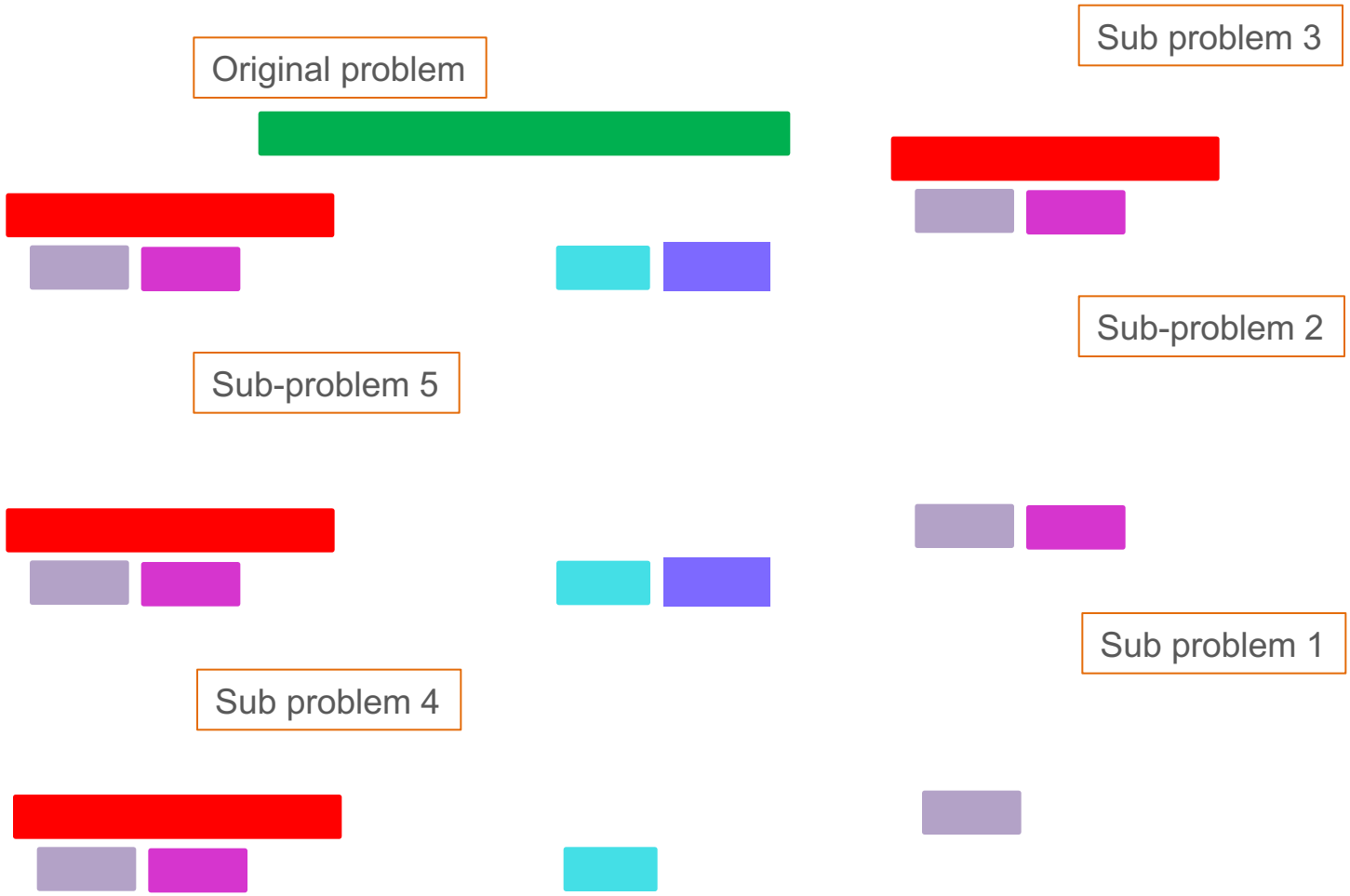
So what sub-problems?

Divide the problem in 2 or more many ~~EQUAL SIZED INDEPENDENT~~ problems

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