Lecture 18

CSE 331

Oct 15, 2021

Please have a face mask on

Masking requirement

UB requires all students, employees and visitors – regardless of their vaccination status – to wear face coverings while inside campus buildings.

https://www.buffalo.edu/coronavirus/health-and-safety/health-safety-guidelines.html

HW 4 is out

Homework 4

Due by **8:00am, Wednesday, October 20, 2021**.

Make sure you follow all the homework policies.

All submissions should be done via Autolab.

The care package on minimizing the maximum lateness problem would be useful for Q3 and *might* be useful for Q2(b) as well.

Probably the easiest HW

Question 1 (High Speed Internet) [50 points]

The Problem

We come back to the issue of many USA regions not having high speed internet. In this question, you will consider an algorithmic problem that you would need to solve to help out a (fictional) place get high speed internet.

You are the algorithms whiz in the effort to bring high speed internet to `SomePlaceInUSA`. After lots of rounds of discussions and public feedback, it was decided that the most cost-effective way to bring high speed internet to `SomePlaceInUSA` was to install high speed cell towers to connect all houses in `SomePlaceInUSA` to high speed internet. There are two things in your favor:

1. It just so happens that all of the n houses in `SomePlaceInUSA` are on the side of a straight road that runs through the town.

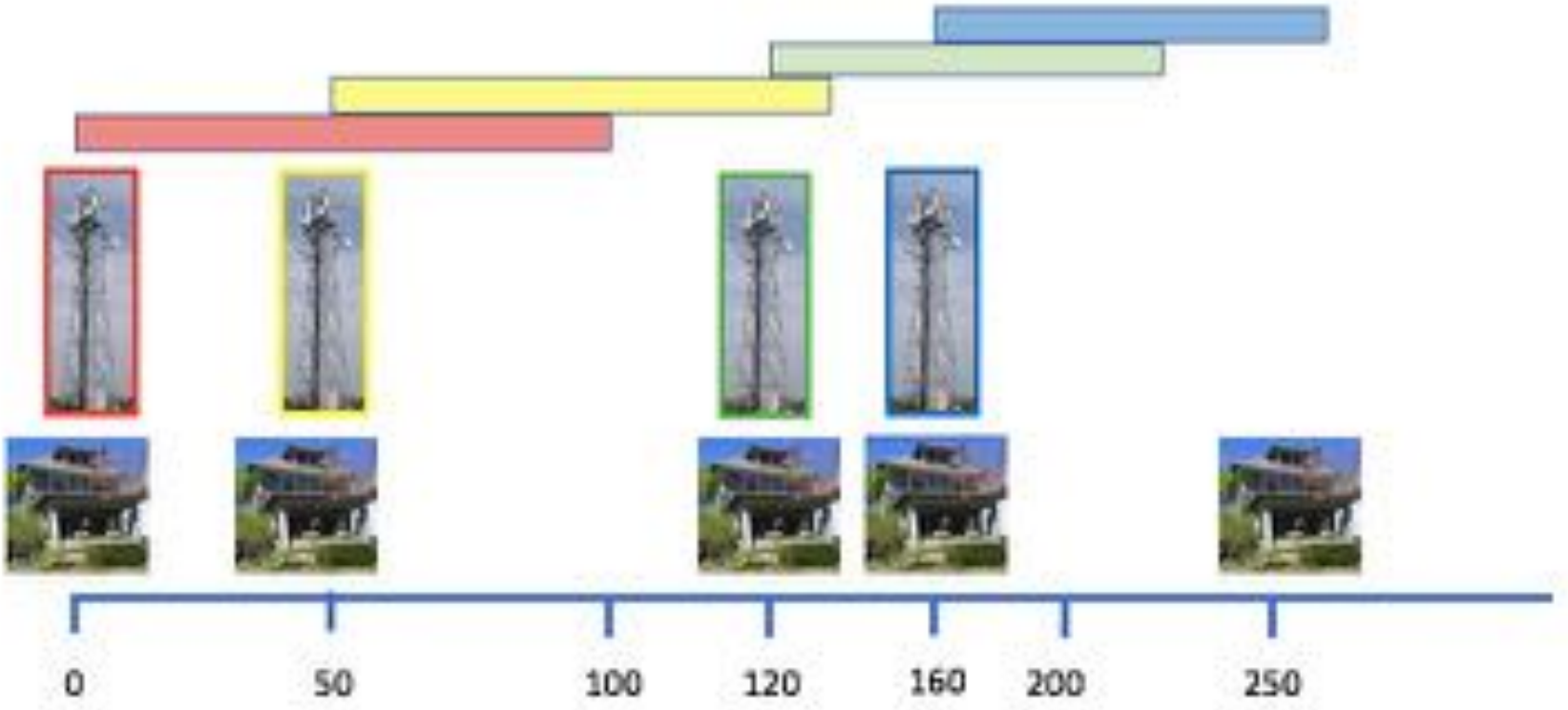
Make broadband more available

BOTH technical and societal issues

Say you are tasked to come up with the infrastructure

HW 4 Q1: How to lay down towers

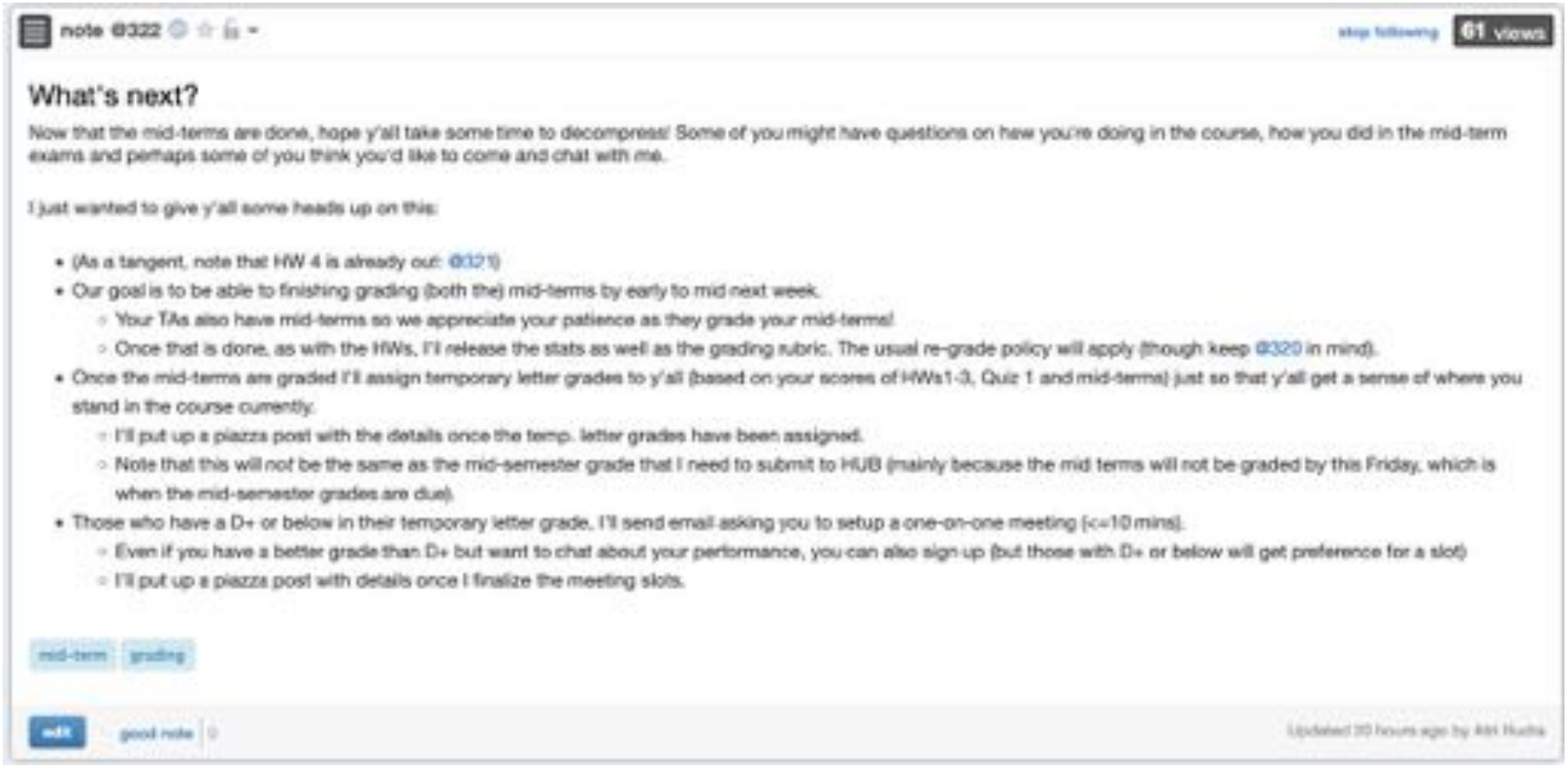
Here is a quick visual argument for the above leads to continuous cell coverage:



Project deadlines coming up

Fri, Oct 29	Counting Inversions F19 F18 F17 x²	[KT, Sec 5.3] (**Project (Problem 1** `Coding` **) in**)
Mon, Nov 1	Multiplying large integers F19 F18 F17 x²	[KT, Sec 5.5] (**Project (Problem 1** `Reflection` **) in**) *Reading Assignment:* Unraveling the mystery behind the identity
Wed, Nov 3	Closest Pair of Points F19 F18 F17 x²	[KT, Sec 5.4]
Fri, Nov 5	Kickass Property Lemma F19 F18 F17 x²	[KT, Sec 5.4] (**Project (Problem 2** `Coding` **) in**)
Mon, Nov 8	Weighted Interval Scheduling F19 F17 x²	[KT, Sec 6.1] (**Project (Problem 2** `Reflection` **) in**)

Some other stuff coming up



note @322

61 views

What's next?

Now that the mid-terms are done, hope y'all take some time to decompress! Some of you might have questions on how you're doing in the course, how you did in the mid-term exams and perhaps some of you think you'd like to come and chat with me.

I just wanted to give y'all some heads up on this:

- (As a tangent, note that HW 4 is already out: @321)
- Our goal is to be able to finishing grading (both the) mid-terms by early to mid next week.
  - Your TAs also have mid-terms so we appreciate your patience as they grade your mid-terms!
  - Once that is done, as with the HWs, I'll release the stats as well as the grading rubric. The usual re-grade policy will apply (though keep @320 in mind).
- Once the mid-terms are graded I'll assign temporary letter grades to y'all (based on your scores of HWs1-3, Quiz 1 and mid-terms) just so that y'all get a sense of where you stand in the course currently.
  - I'll put up a piazza post with the details once the temp. letter grades have been assigned.
  - Note that this will *not* be the same as the mid-semester grade that I need to submit to HUB (mainly because the mid terms will not be graded by this Friday, which is when the mid-semester grades are due).
- Those who have a D+ or below in their temporary letter grade, I'll send email asking you to setup a one-on-one meeting (<=10 mins).
  - Even if you have a better grade than D+ but want to chat about your performance, you can also sign up (but those with D+ or below will get preference for a slot)
  - I'll put up a piazza post with details once I finalize the meeting slots.

mid-term grading

edit good note

Mid-semester grade on HUB

Note on re-grade requests


note @320

82 views

TA Response-Time on Regrade Requests

To give you a small behind-the-scenes on 331, we wanted to make you aware that many TAs choose to purposely delay responding to regrade requests. There is a reason for this. This allows the TA to really think about the student response and grade given. This also allows the student to distance themselves from the understandable frustration/emotion associated with receiving an (allegedly) unfair grade. Having both TA-ed and taken this course before, I can say that this deliberate delay is immensely helpful for both students and staff.

All that being said, **we ask that you please wait at least 36 hours before following up on a re-grade request.** As long as your initial email was sent before the regrading deadline, you will have your regrade request entertained.

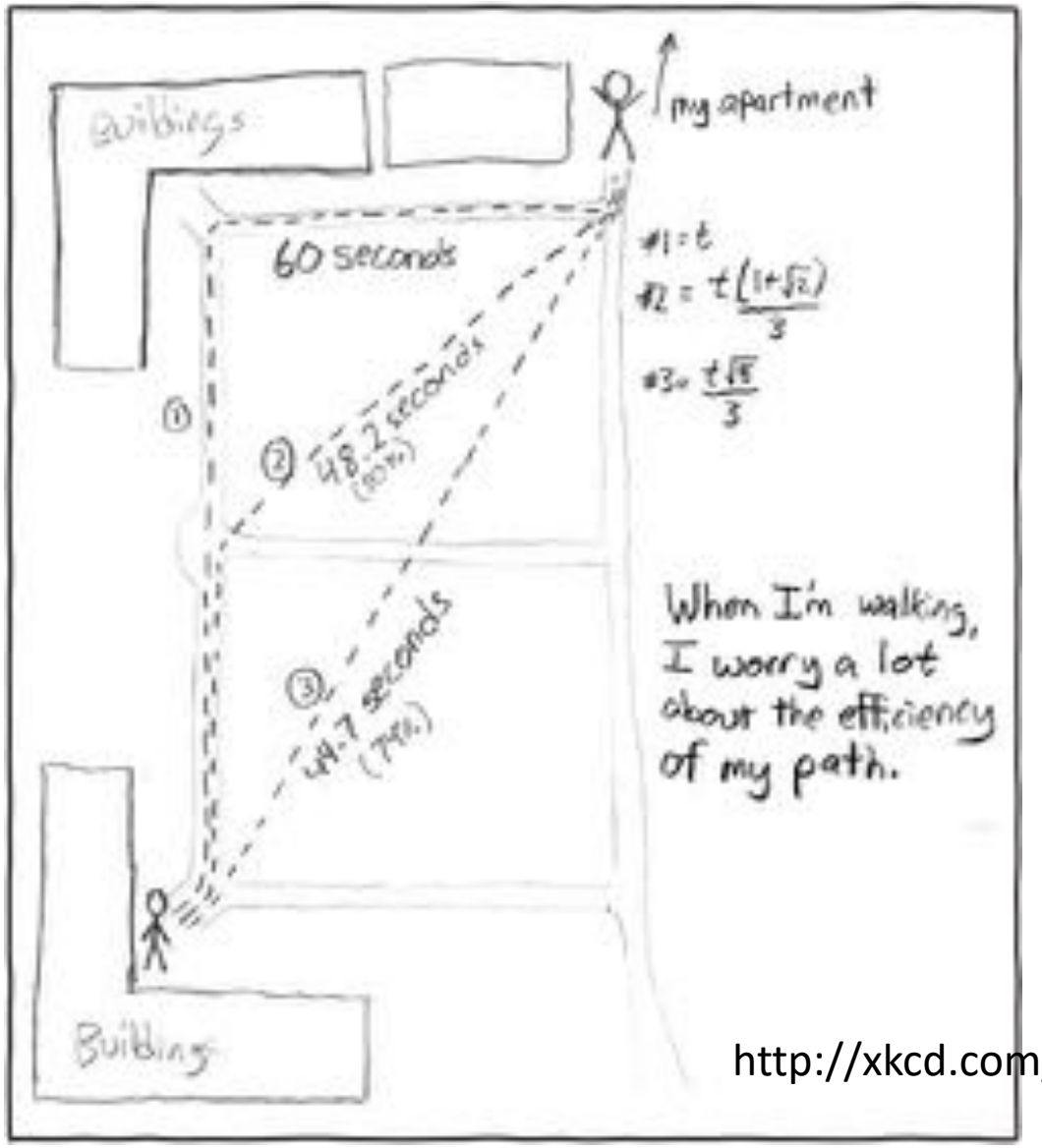
edit

good note | 0

Updated 1 day ago by Joseph Wu

Questions?

Shortest Path Problem



http://xkcd.com/85/

Another more important application

Is BGP a known acronym for you?

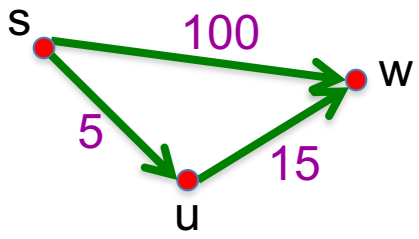
Routing uses shortest path algorithm

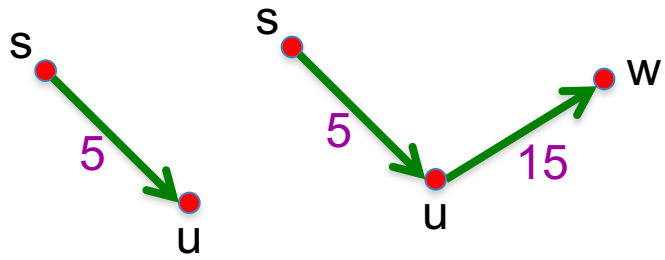
Shortest Path problem

Input: *Directed* graph G=(V,E)

Edge lengths, l_e for e in E

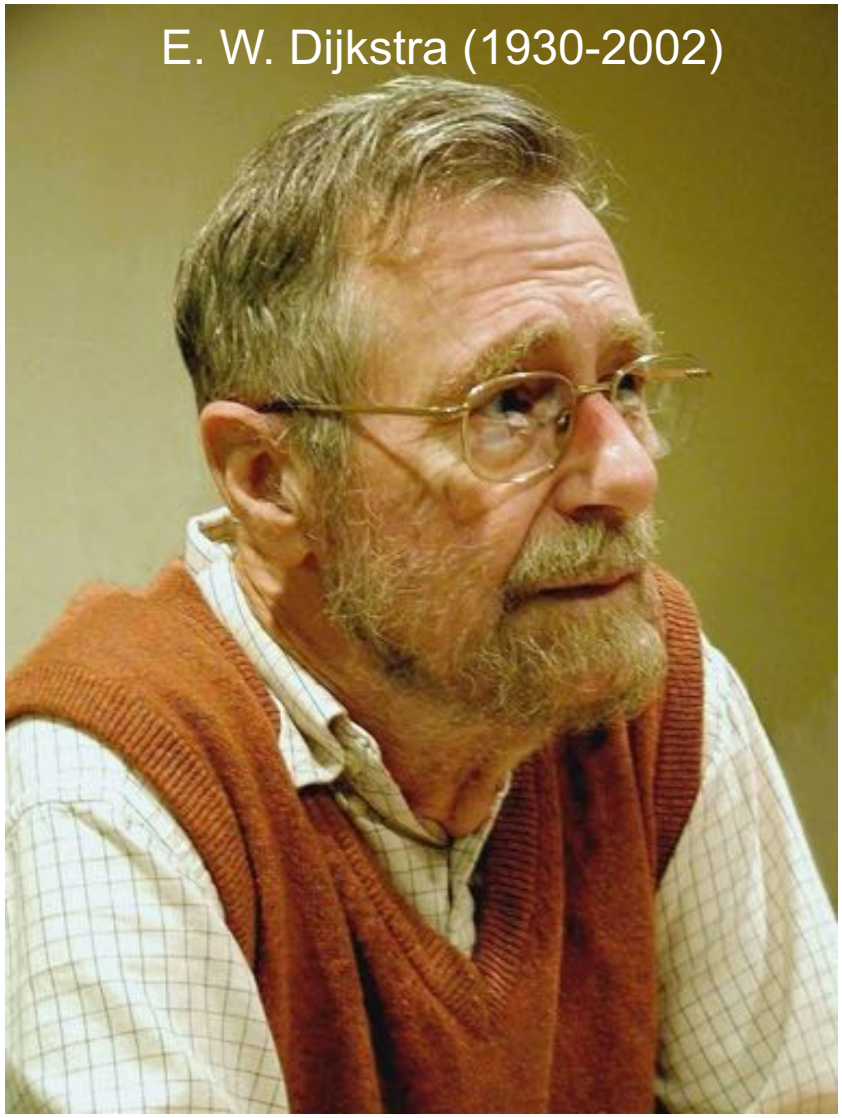
"start" vertex s in V



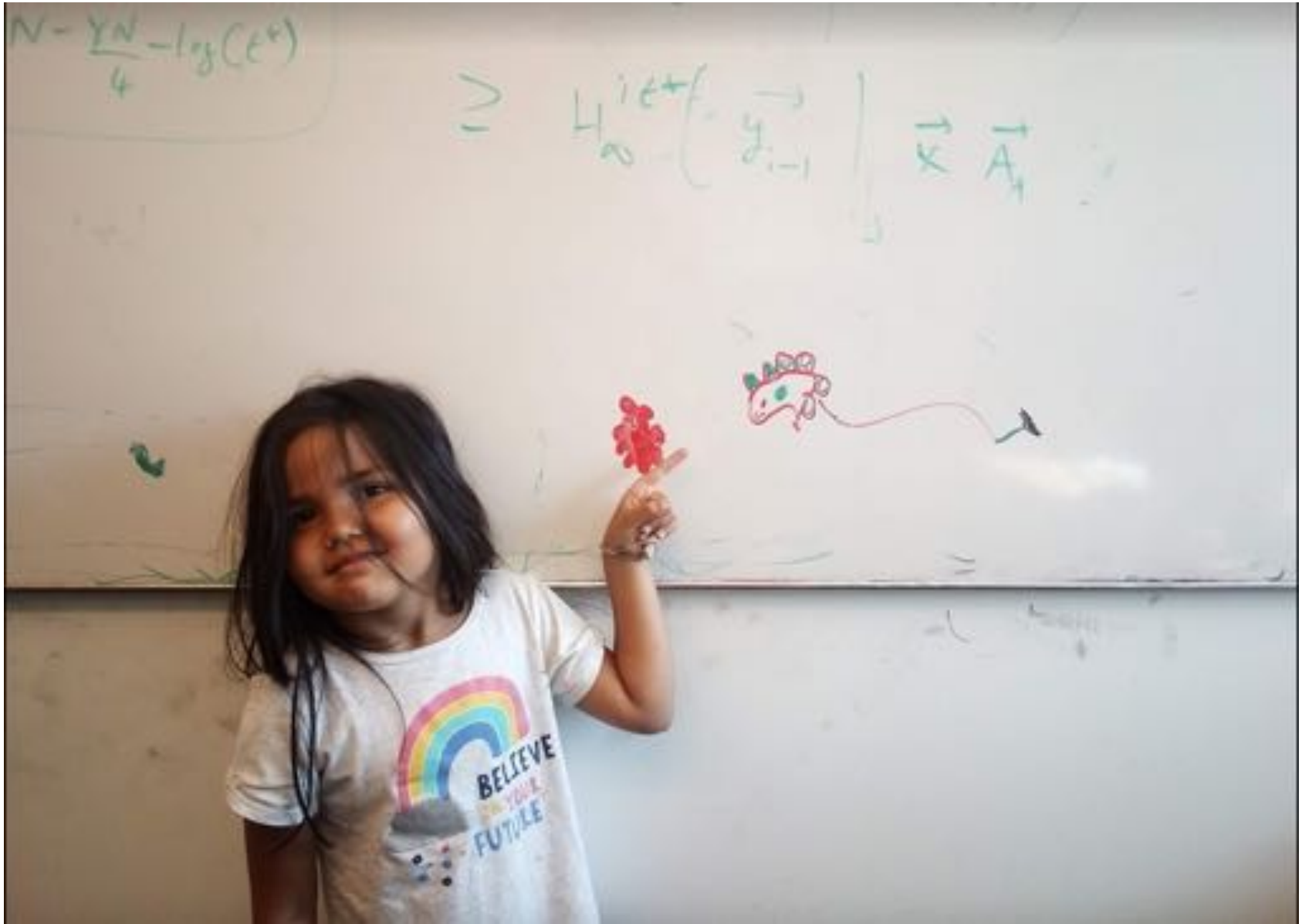


Output: Length of shortest paths from s to all nodes in V

Dijkstra's shortest path algorithm



Questions/Comments?

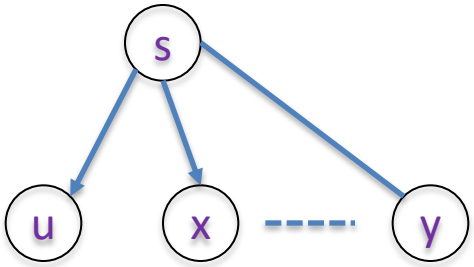


On to the board…

Towards Dijkstra's algo: part ek

Determine d(t) one by one

d(s) = 0

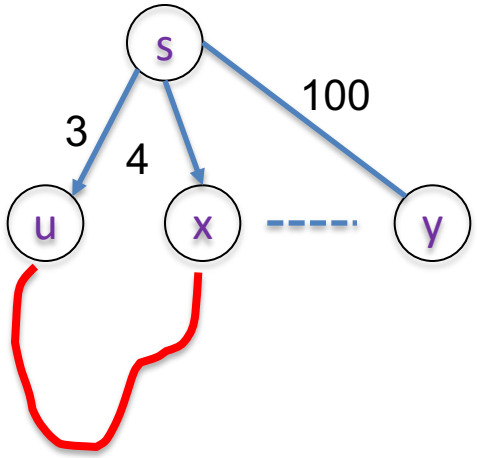


Towards Dijkstra's algo: part do

Determine d(t) one by one

Let u be a neighbor of s with smallest $l_{(s,u)}$

$$d(u) = l_{(s,u)}$$



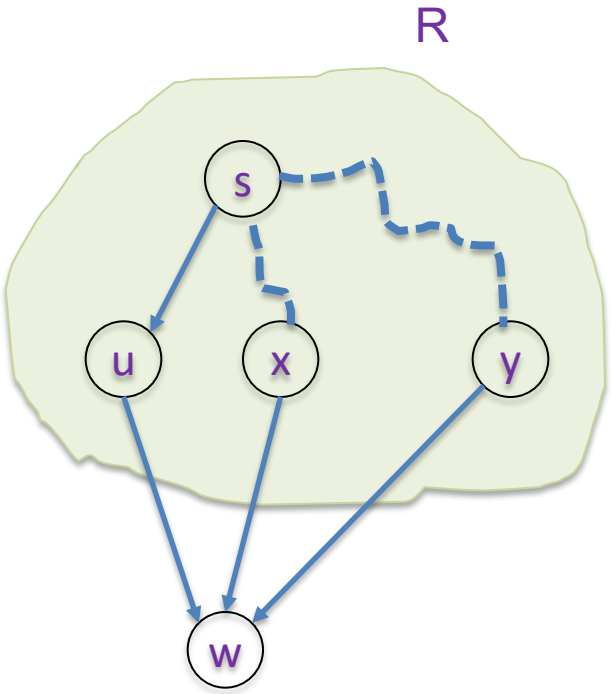
Length of ~ is ≥ 0

Not making any claim on other vertices

Towards Dijkstra's algo: part teen

Determine d(t) one by one

Assume we know d(v) for every v in R



Compute an upper bound d'(w) for every w not in R

$d(w) \leq d(u) + l_{(u,w)}$

$d(w) \leq d(x) + l_{(x,w)}$

$d(w) \leq d(y) + l_{(y,w)}$

$d'(w) = \min_{e=(u,w) \text{ in } E,\ u \text{ in } R} d(u)+l_e$