

Lecture 14

CSE 331

Sep 29, 2023

If you need it, ask for help



Register project groups **TONIGHT!**

Deadline: Friday, Sep 29, 11:59pm

CSE 331

Syllabus

Piazza

Schedule

Homeworks ▾

Autolab

Project ▾

Support Pages ▾

channel

Sample Exams ▾

Forming groups

You form groups of size **exactly three (3)** for the project. Below are the various logis

Project Overview

Group signup form

- You have two choices in forming your group:

1. You can form your group on your own: i.e. you can submit the list of **EXACTLY three (3)** groups members in your group.

</> Note

Note that if you pick this option, your group needs to have **exactly THREE (3)** members. In particular, if your group has only two members you cannot submit as a group of size two. If you do not know many people in class, feel free to use piazza to look for the third group member.

Also, if you form a group of size three, please make only **one submission per group**.

2. You can submit *just your name*, and you will be assigned a random group *among all students who take this second option*. However, **note that if you pick this option you could end up in a group of size 2**. There will be at most two groups of size 2.

</> Potential risk

Note that if you pick the option of being assigned a random group, you take on the risk that a assigned group might not "pull their weight." We unfortunately cannot help with such aspects of group dynamics. (Of course if a group member is being abusive, please do let Atri know.) Please note that a group member who does not do much work will get penalized on the [individual component](#) of the project grade.

Submitting your group composition

Use [this Google form](#) to submit your group composition (the form will allow you to pick one of the two options above).

- You need to fill in the form for group composition by **11:59pm on Friday, September 30**.

</> Deadline is strict!

If you do not submit the form for group composition by the deadline, then you get a **zero for the entire project**.

Upcoming quiz/exams

Quiz 1 Friday NEXT week

Mid-term 1 Wednesday Oct 18

Mid-term 2 Fri two days after Mid-term 1

Bit more on Quiz 1

 note @223   

stop following **0 views**

Actions ▾

Quiz 1 on Friday, Oct 6

The first quiz will be from **11:00-11:10am in class** on **Friday, October 6**. We will have a 5 mins break after the quiz and the lecture will start at 11:15am.

We will hand out the quiz paper at 10:55am but you will **NOT** be allowed to open the quiz to see the actual questions till 11:00am. However, you can use those 5 minutes to go over the instructions and get yourself in the zone.

There will be two T/F with justification questions (like those in the T/F polls.) I will post sample mid-terms by Monday night so that you'll be able to see the formatting of such T/F questions.

Also quiz 1 will cover all topics we cover in class until Monday, Oct 2.

Also like the mid-term y'all can bring in one letter sized cheat-sheet (you can use both sides). But other than cheatsheet and writing implements nothing else is allowed.

quiz1

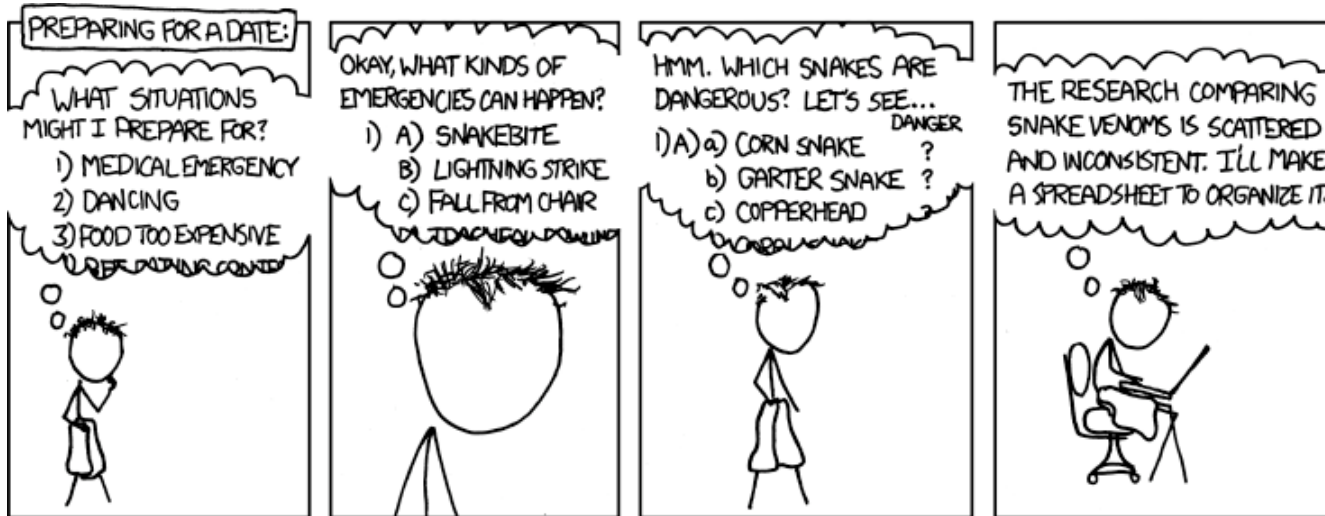
Edit good note | 0

Updated 2 minutes ago by Atri Rudra

Questions?



Depth First Search (DFS)



<http://xkcd.com/761/>



I REALLY NEED TO STOP USING DEPTH-FIRST SEARCHES.

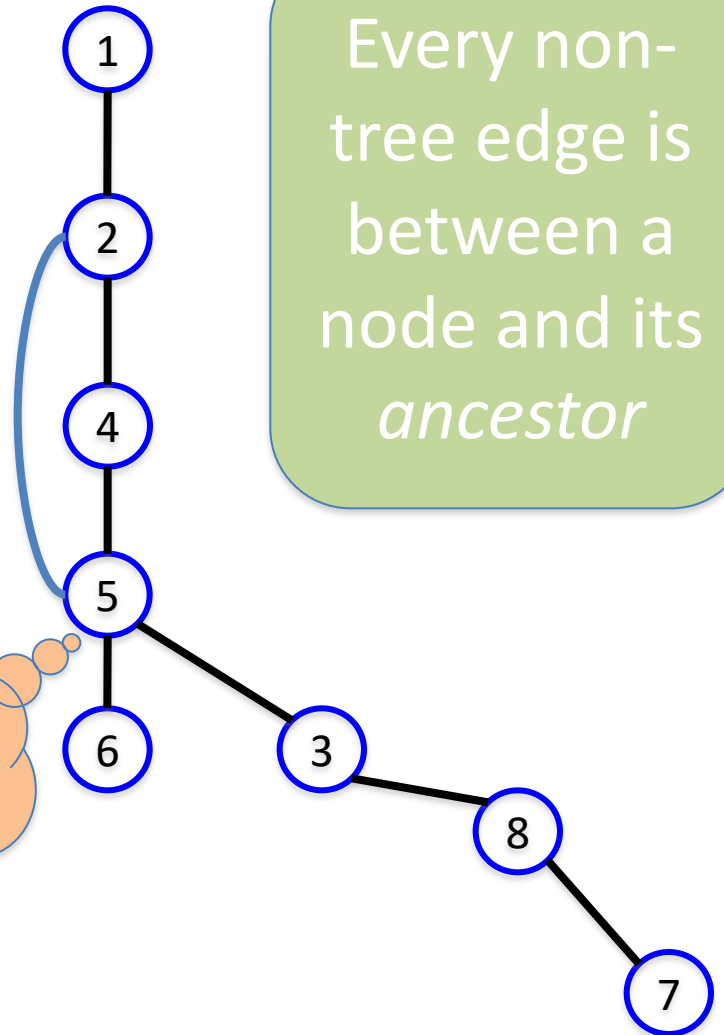
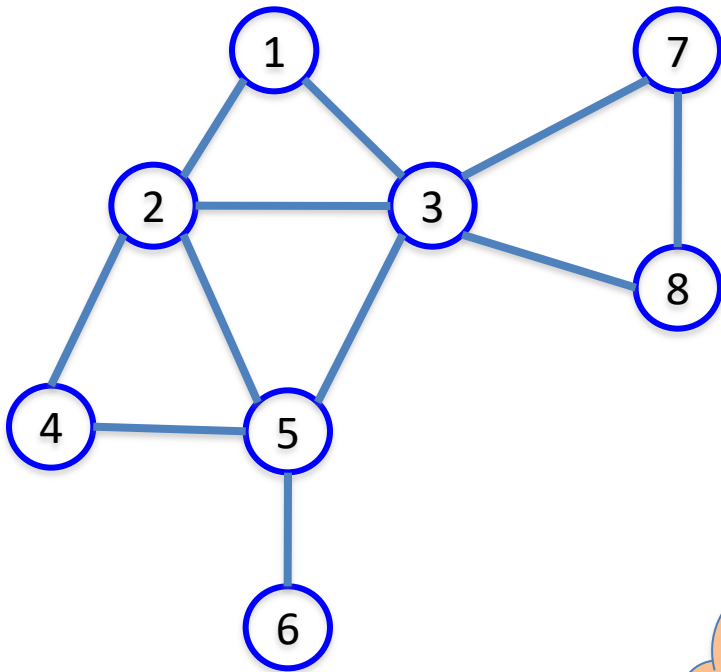
DFS(**u**)

Mark **u** as explored and add **u** to **R**

For each edge (**u**,**v**)

 If **v** is not explored then DFS(**v**)

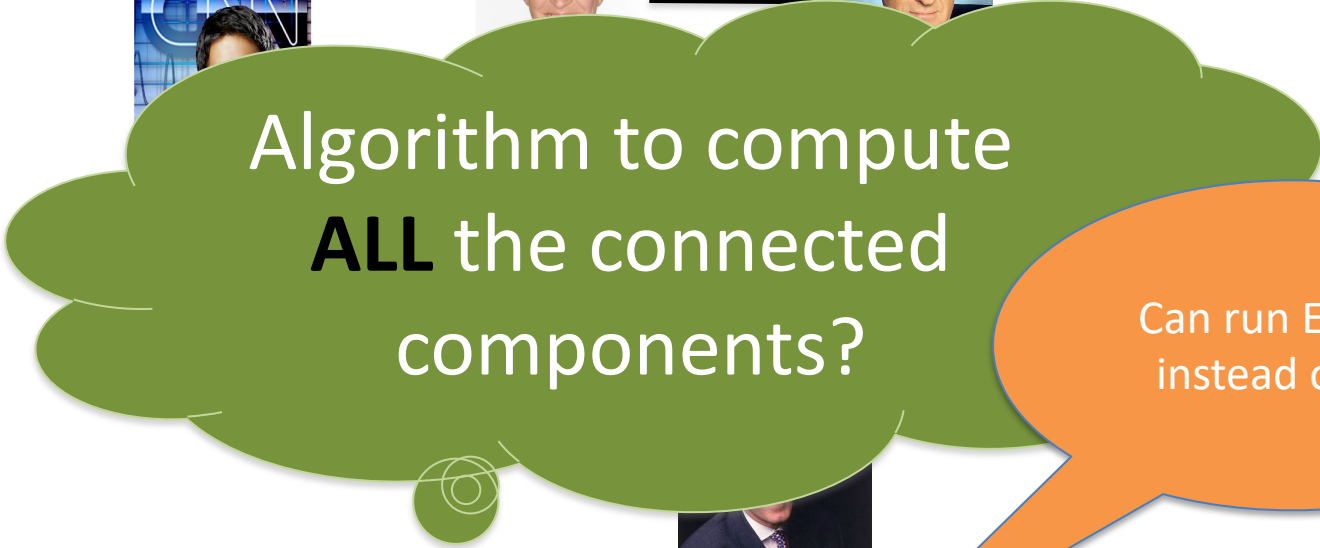
A DFS run



Every non-tree edge is between a node and its *ancestor*

Connected components are disjoint

Either Connected components of s and t are the same or are disjoint



Algorithm to compute
ALL the connected
components?

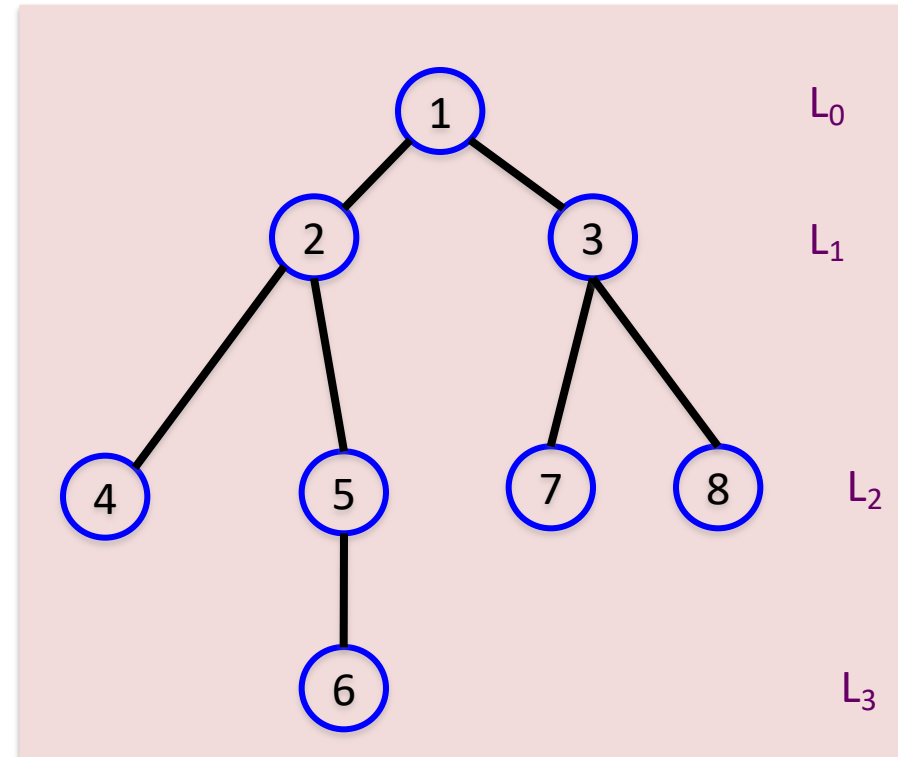
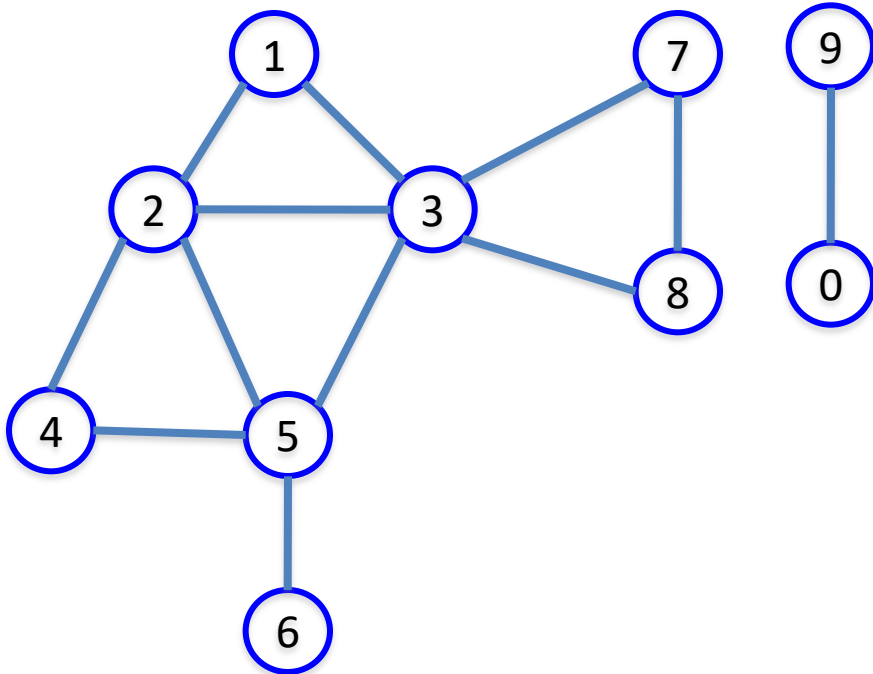
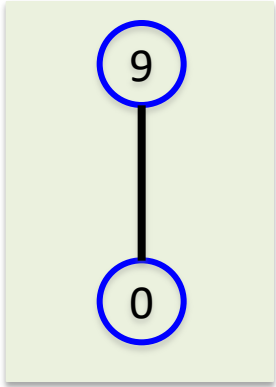


Can run Explore
instead of BFS

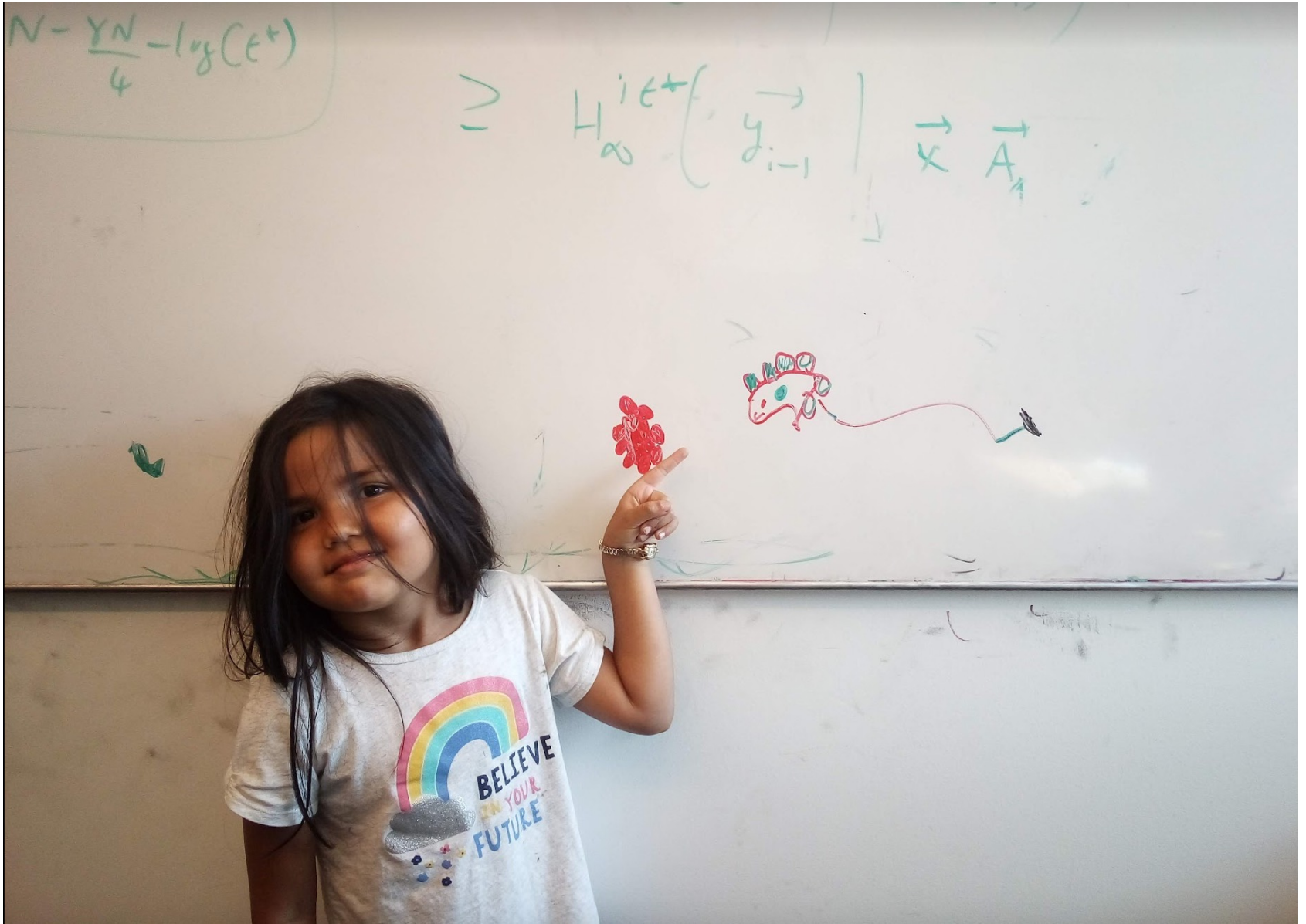


Run BFS on some node s . Then run BFS on t that is not connected to s

Computing all CCs



Questions/Comments?



Today's agenda

Run-time analysis of BFS (DFS)



Stacks and Queues



Last in First out

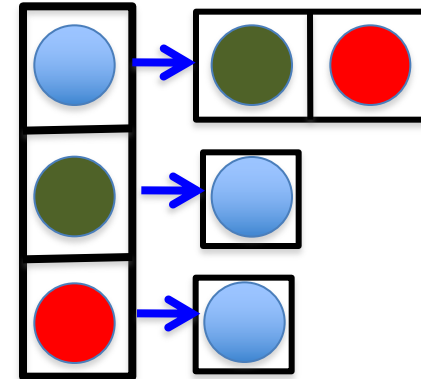
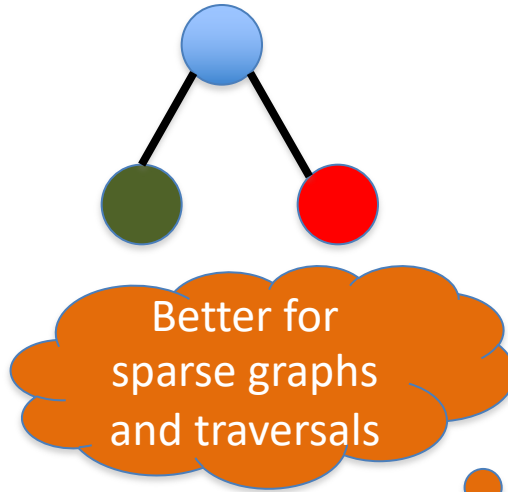
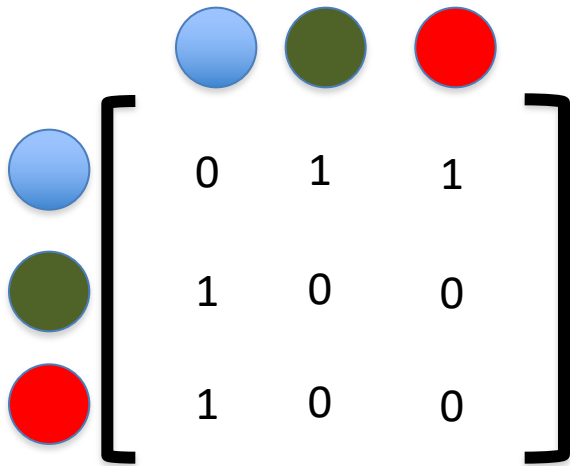


First in First out

But first...

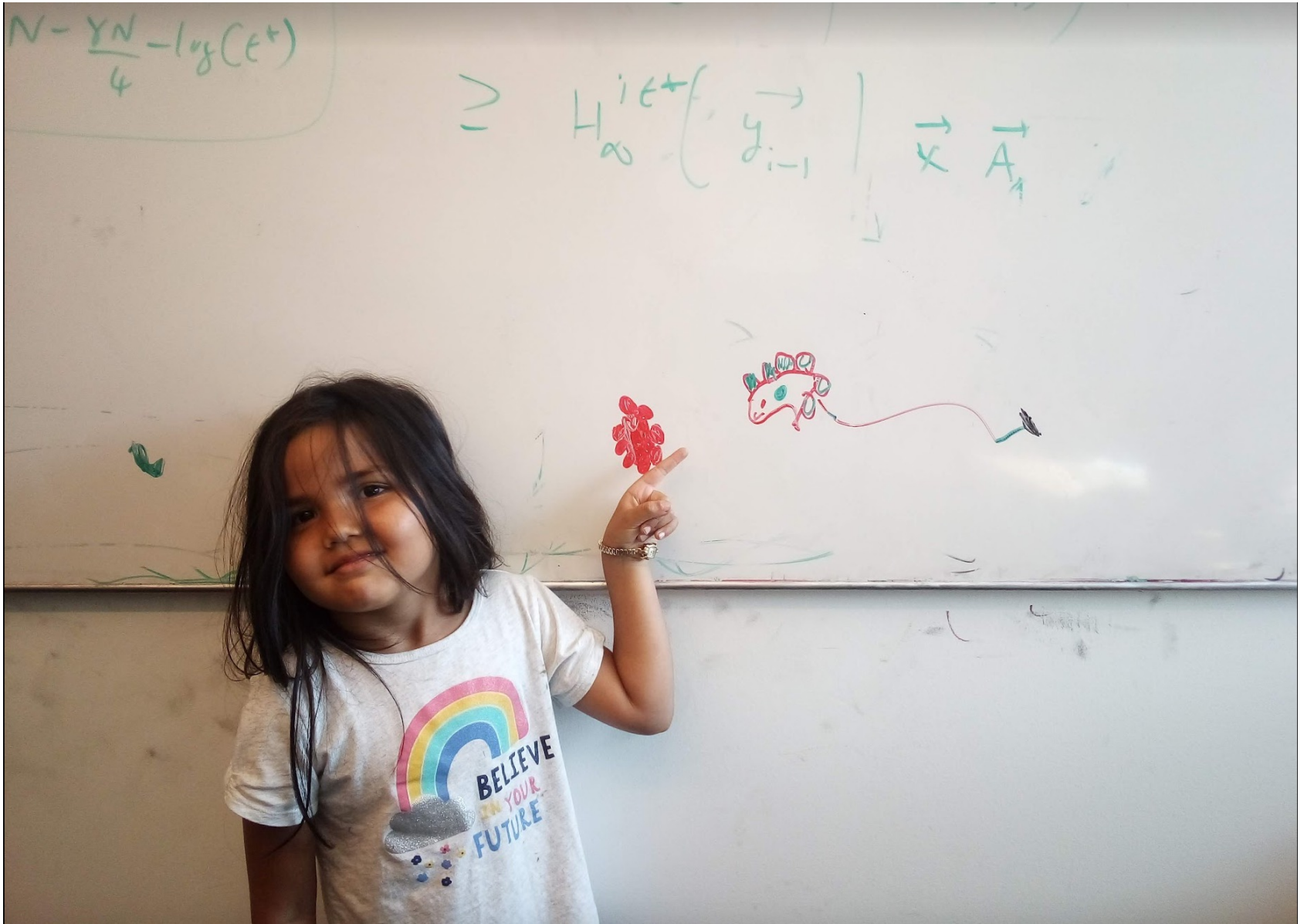
How do we represent graphs?

Graph representations



Adjacency matrix		Adjacency List
$O(1)$	$(u,v) \in E?$	$O(n) [O(n_v)]$
$O(n)$	All neighbors of u ?	$O(n_u)$
$O(n^2)$	Space?	$O(m+n)$

Questions/Comments?

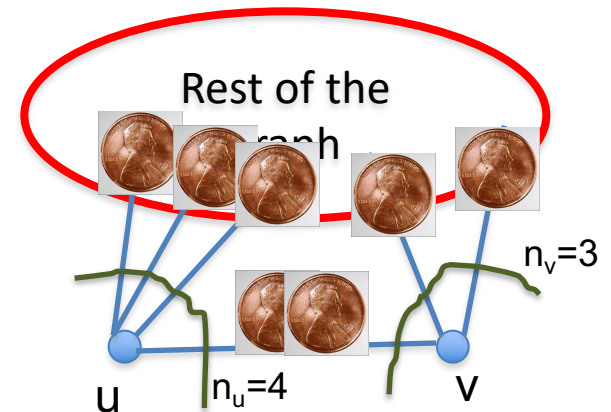


2 · # edges = sum of # neighbors

$$2m = \sum_{u \text{ in } V} n_u$$

Give 2 pennies to each edge

Total # of pennies = $2m$



Each edges gives one penny to its end points

of pennies u receives = n_u

Breadth First Search (BFS)

Build layers of vertices connected to s

$$L_0 = \{s\}$$

Assume L_0, \dots, L_j have been constructed

L_{j+1} set of vertices not chosen yet but are connected to L_j

Stop when new layer is empty

Use linked lists

Use $CC[v]$ array

Rest of Today's agenda

Space complexity of Adjacency list representation

Quick run time analysis for BFS

Quick run time analysis for DFS (and Queue version of BFS)