

Lecture 5

CSE 331

Sep 10, 2019

Please have a face mask on

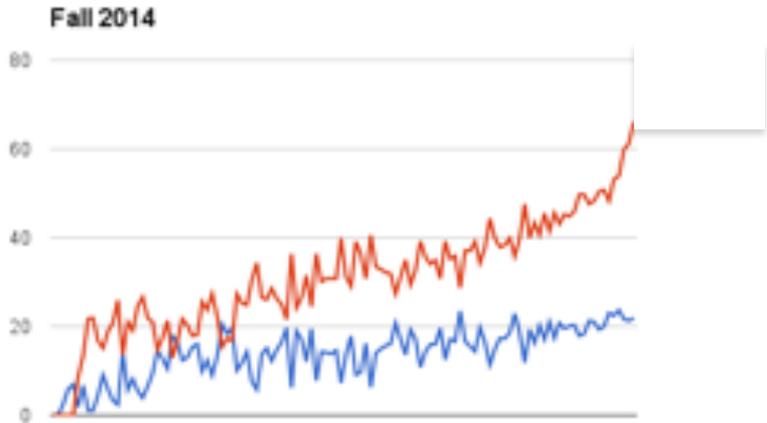
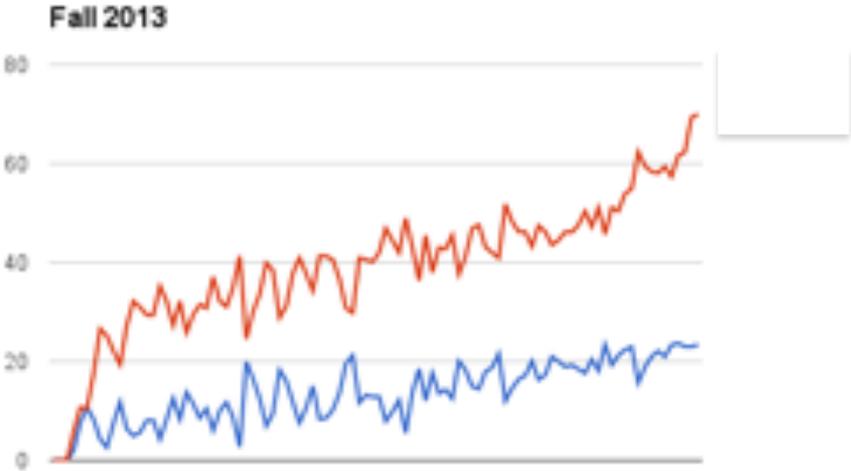
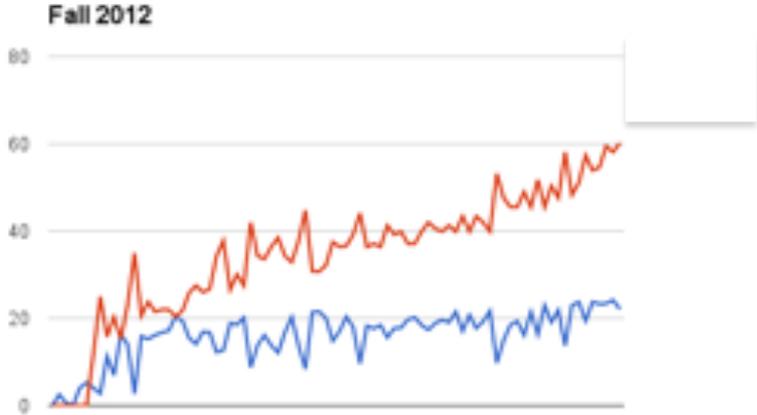
Masking requirement



UR 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>

Can you guess the correlation?



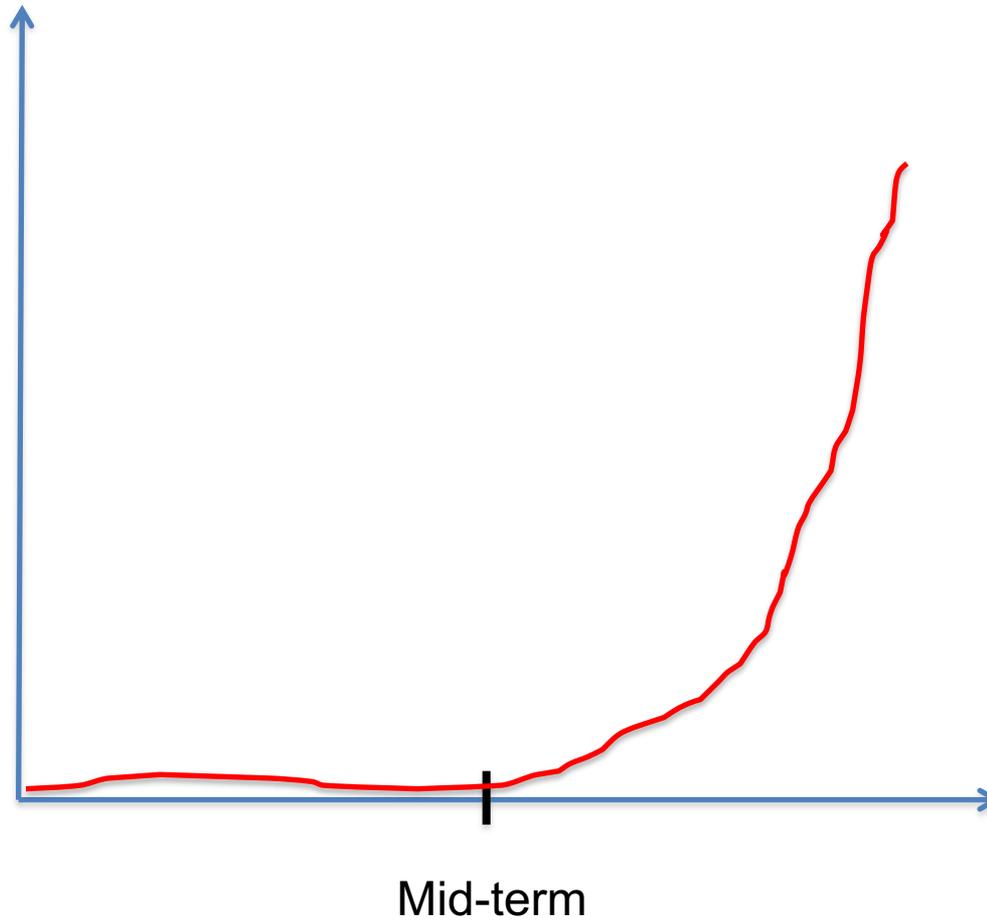
Another comment

Discomfort with proofs

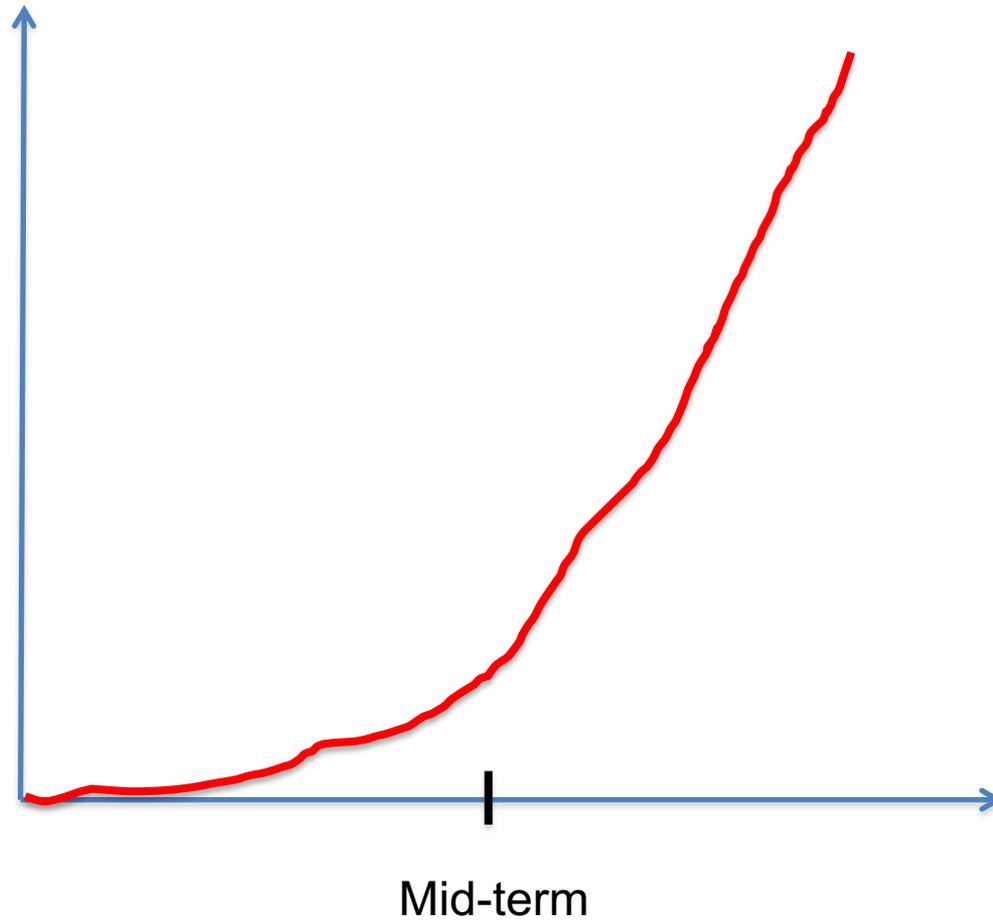
I will not cover proof basics in class anymore

Please read support pages and some utilize (next few) Office hours!

Lecture pace (till Fall 18)



Lecture pace



Register your project groups

Deadline: Friday, Oct 1, 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 options.

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.

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.

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, October 1**.

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**.

Do come to late night OH!

note @80   

stop following **5 views**

Recording of today's late night office hours

Thanks to everyone who stopped by! We had some nice discussions (including some more philosophical ones like why do we do proofs in 331 while most of the rest of the courses are coding based and a discussion on why the solution to Q1(a) on HW 0 that we handed out was actually correct):

<https://ub.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=0af0481c-33e4-4a39-a997-ac2f002e13cc>

Please note that nothing happens between 23:00 and 29:30 so you can safely skip that portion.

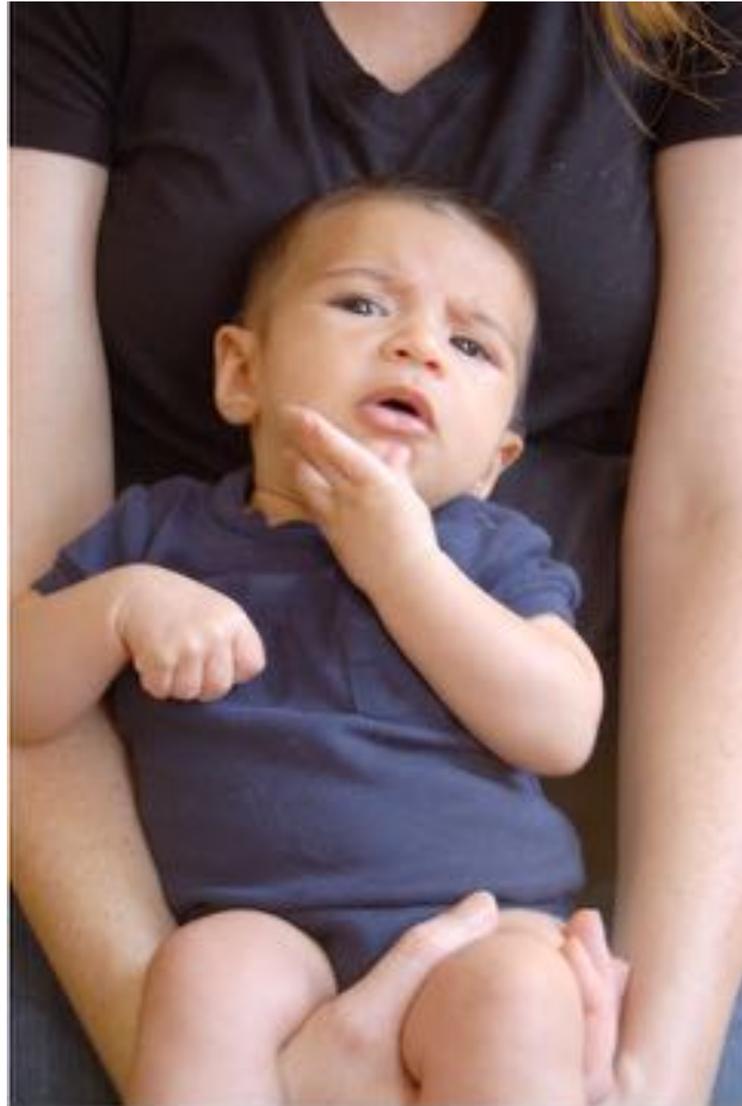
Hope to see more of y'all Thursday next week!

office_hours

good note 

Updated 1 minute ago by Air Rustle

Questions/Comments?



(Perfect) Matching

A matching $S \subseteq M \times W$ such that following conditions hold:

S is a **set** of pairs (m,w) where m in M and w in W

- (1) For every woman w in W , exist *at most* ^{exactly} one m such that (m,w) in S
- (2) For every man m in M , exist *at most* ^{exactly} one w such that (m,w) in S

Perfect matching

On matchings

Mal



Inara



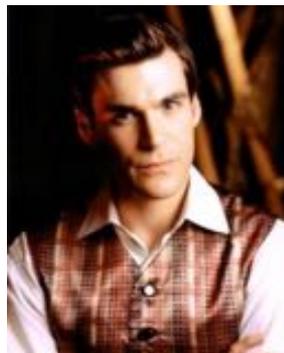
Wash



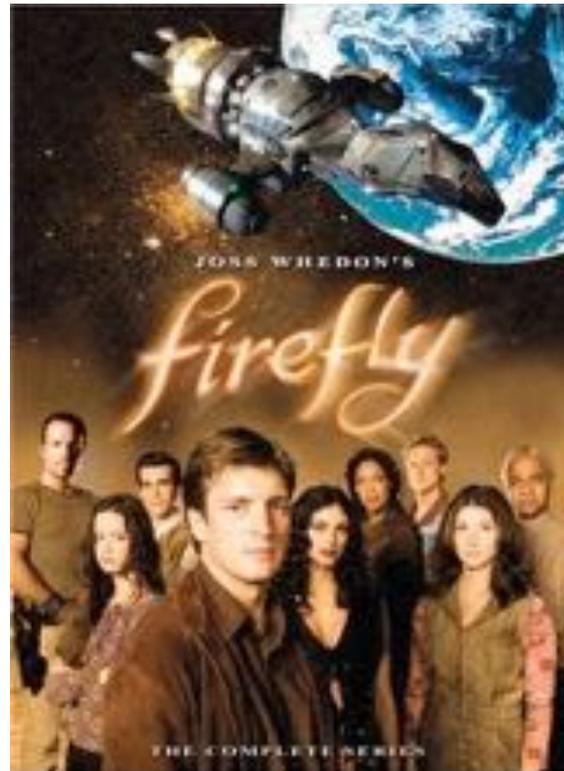
Zoe



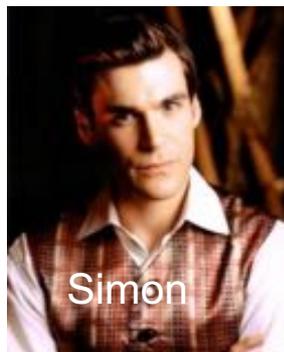
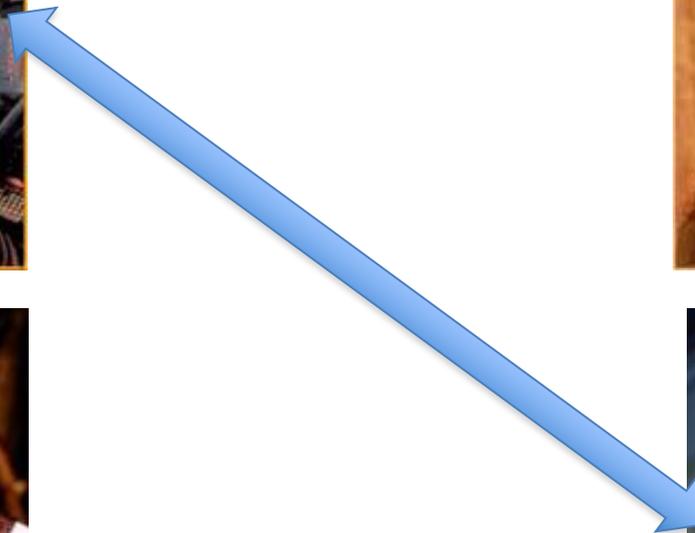
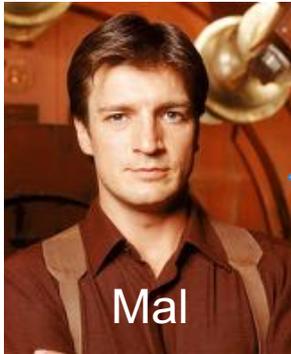
Simon



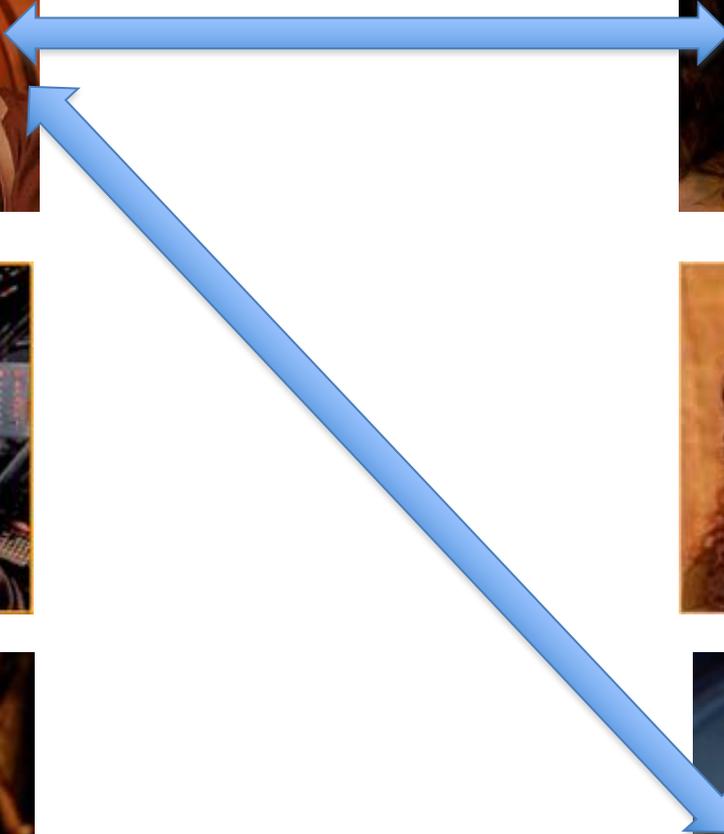
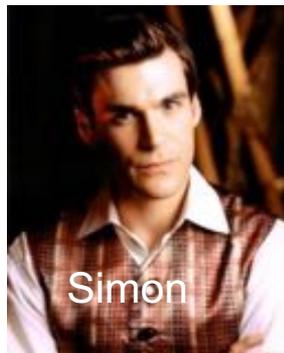
Kaylee



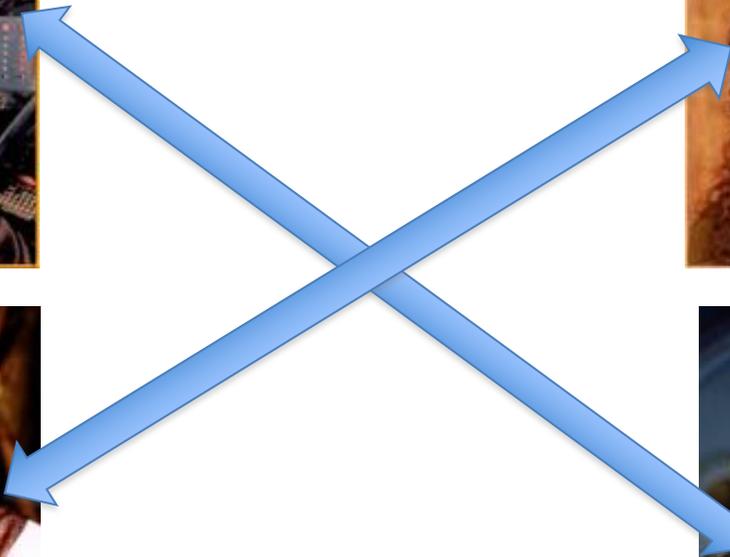
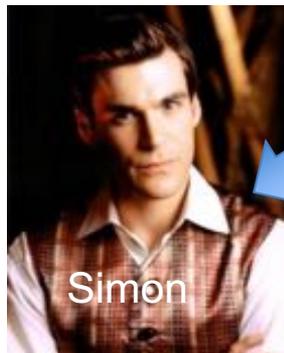
A valid matching



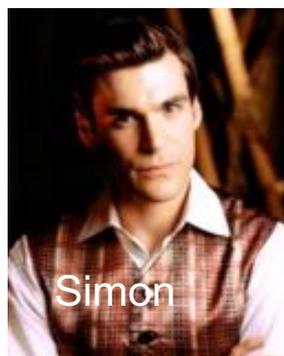
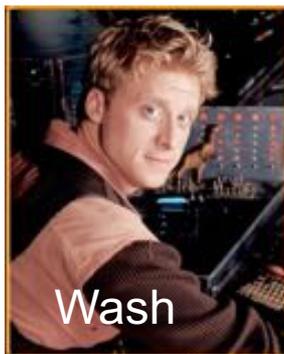
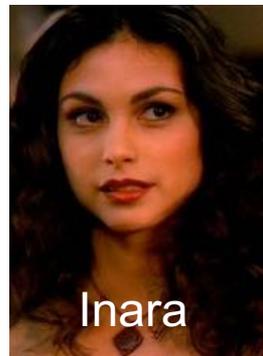
Not a matching



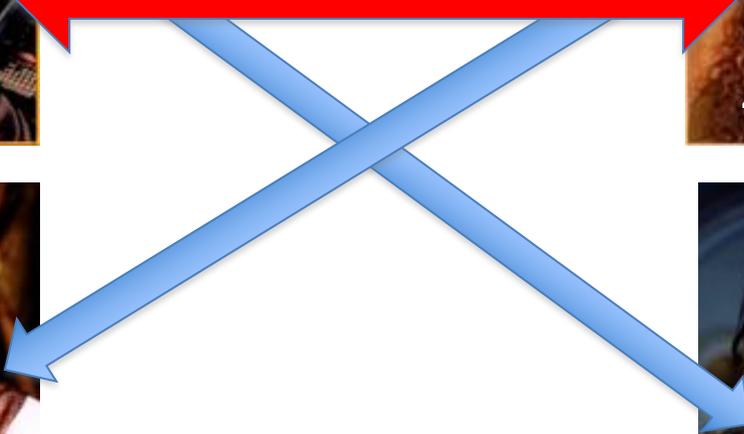
Perfect Matching



Preferences

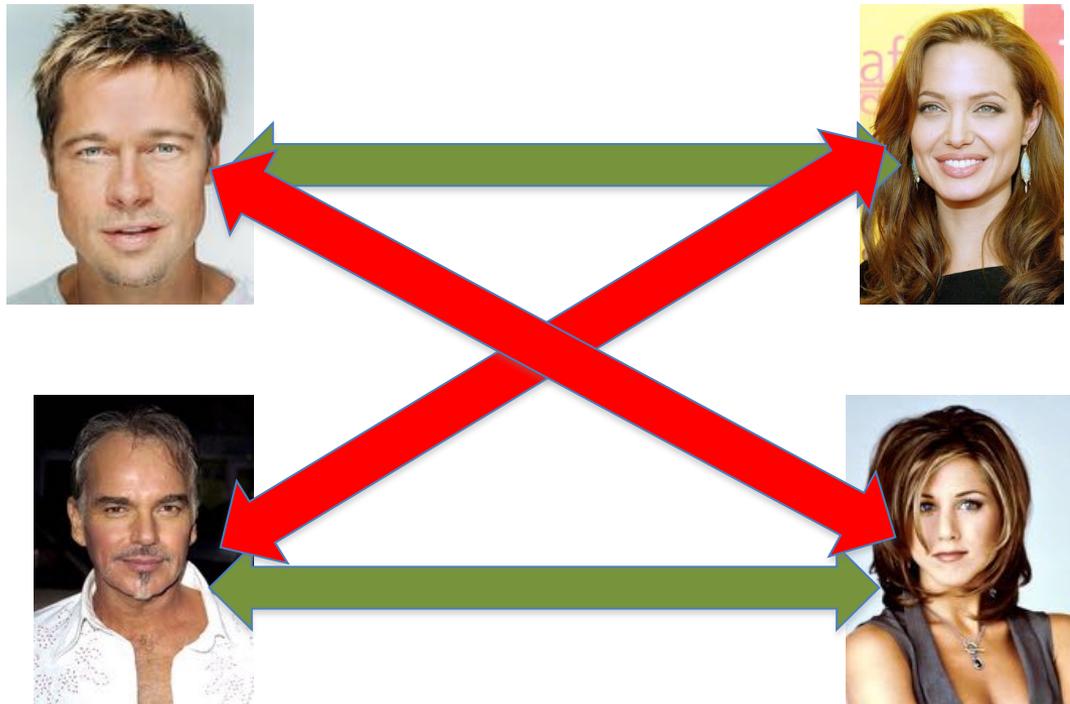


Instability

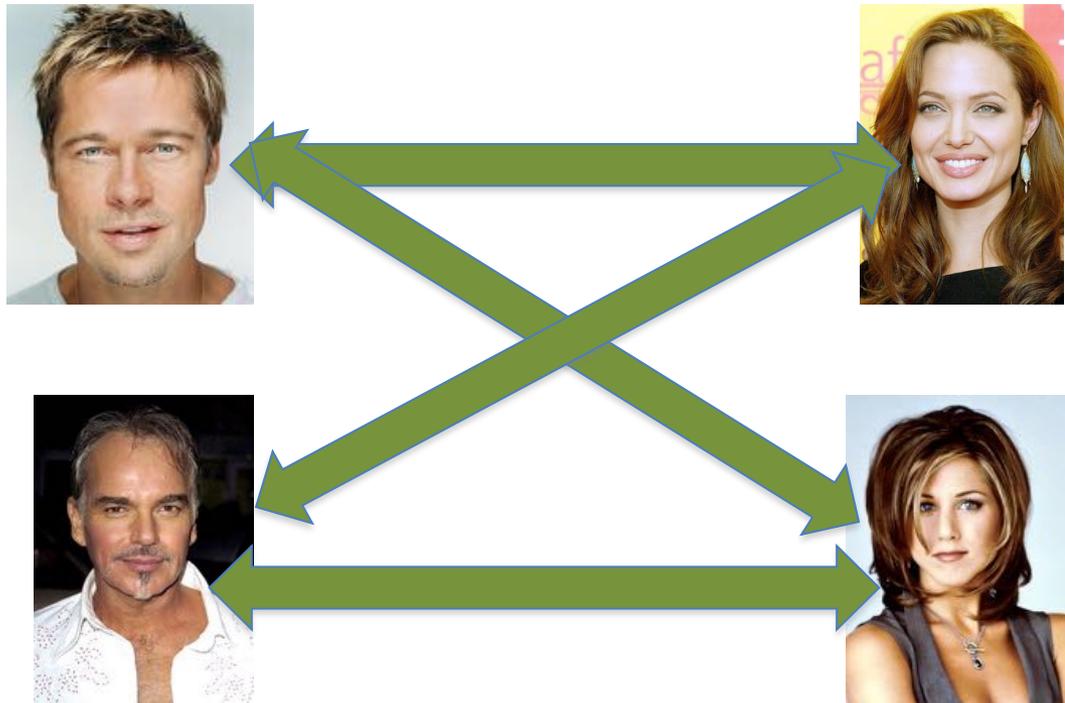


A stable marriage

Even though BBT and JA are not very happy



Two stable marriages



Stable Marriage problem

Set of men M and women W

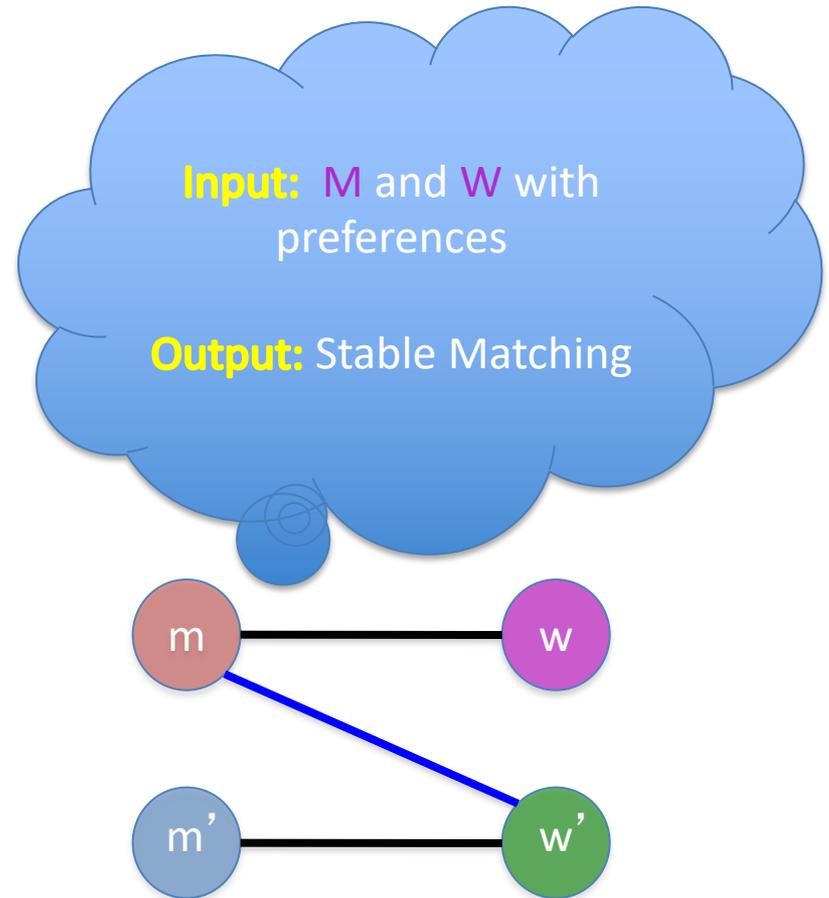
Preferences (ranking of potential spouses)

Matching (no polyandry/gamy in $M \times W$)

Perfect Matching (everyone gets married)

Instability

Stable matching = perfect matching + no instability



Two Questions

Does a stable marriage always exist?

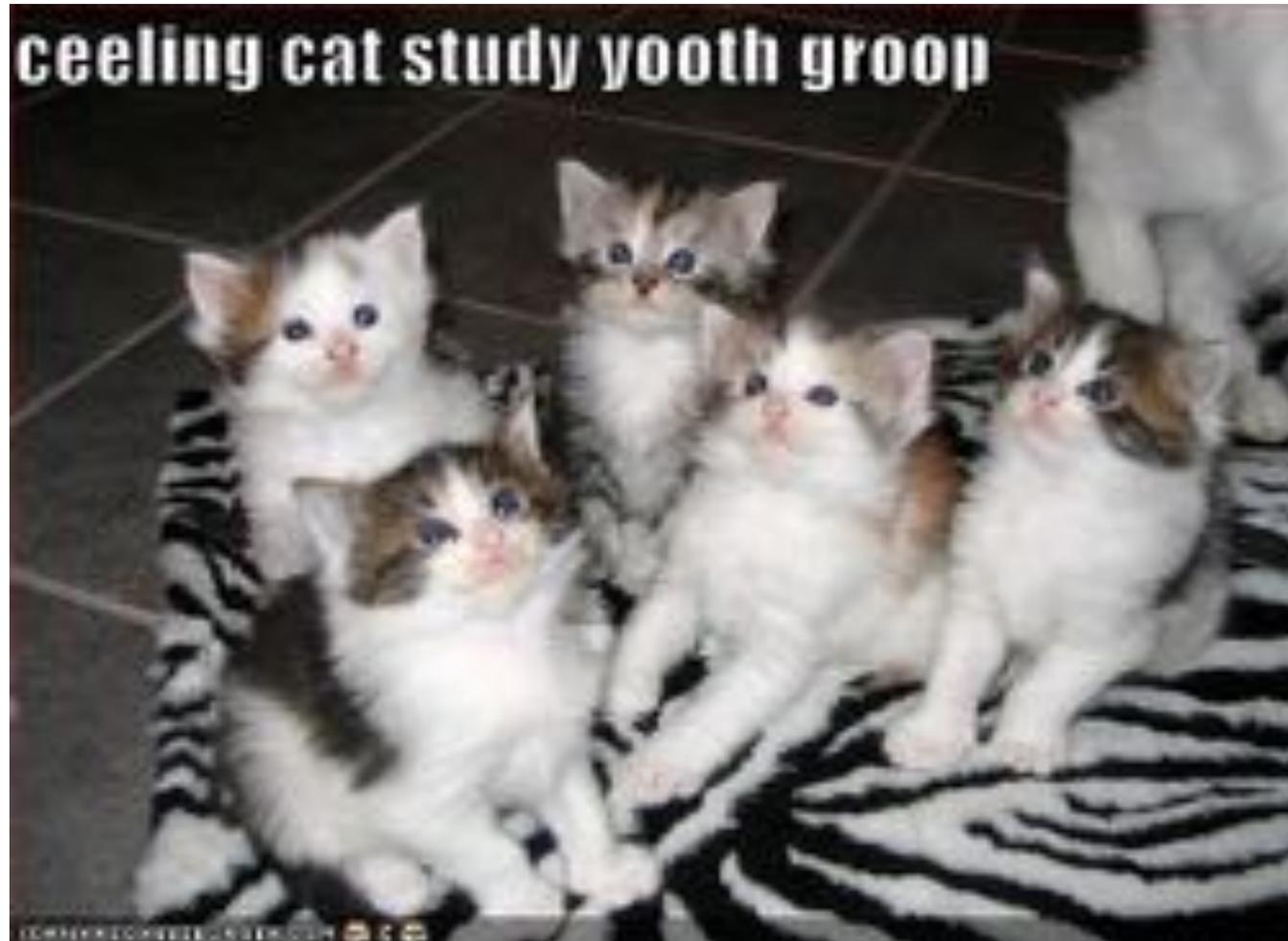
If one exists, how quickly can we compute one?

Today's lecture

Naïve algorithm

Gale-Shapley algorithm for Stable Marriage problem

Discuss: Naïve algorithm!



The naïve algorithm

Incremental algorithm to produce all $n!$ perfect matchings?

Go through all possible perfect matchings S

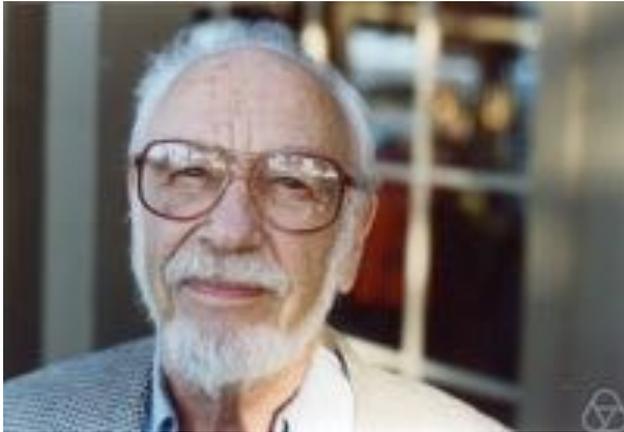
If S is a stable matching

then Stop



Else move to the next perfect matching

Gale-Shapley Algorithm



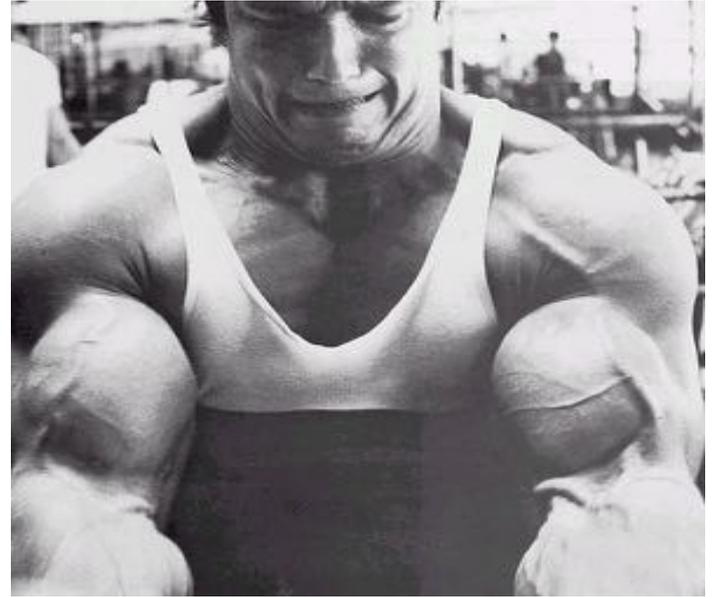
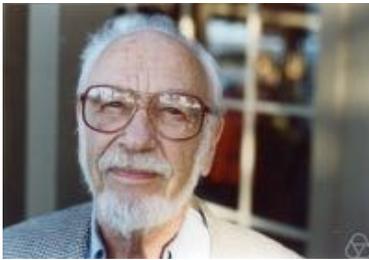
David Gale



Lloyd Shapley

$O(n^2)$ algorithm

Moral of the story...



Questions/Comments?



Rest of today's agenda

Gale Shapley (GS) algorithm

Run of GS algorithm on an instance