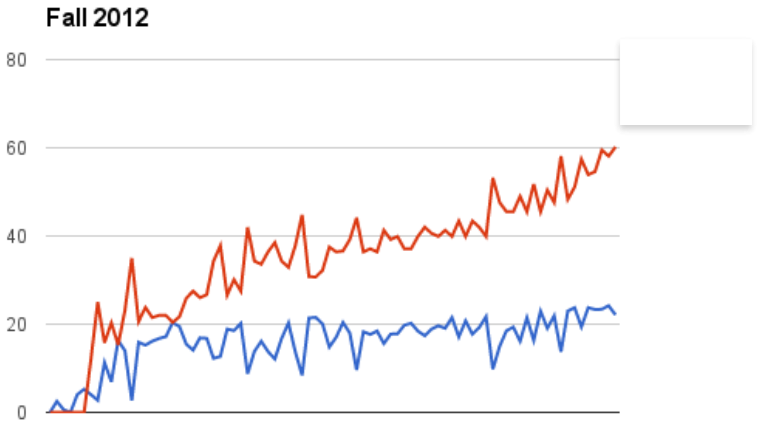
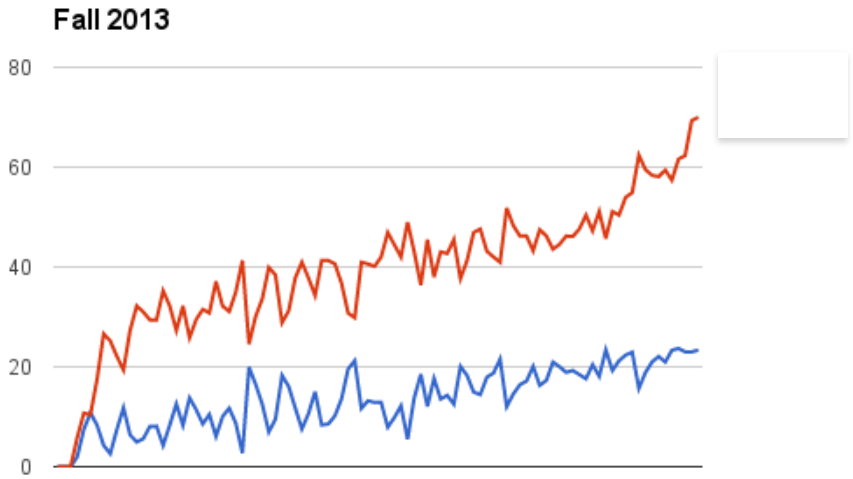
# Lecture 5

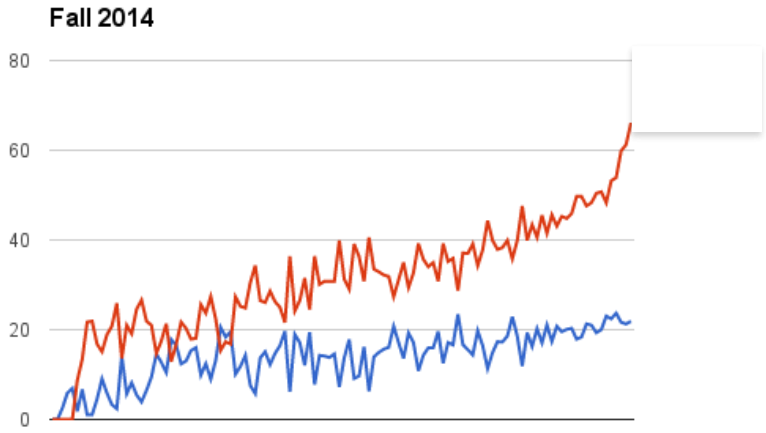
CSE 331

Sep 6, 2024

# Can you guess the correlation?



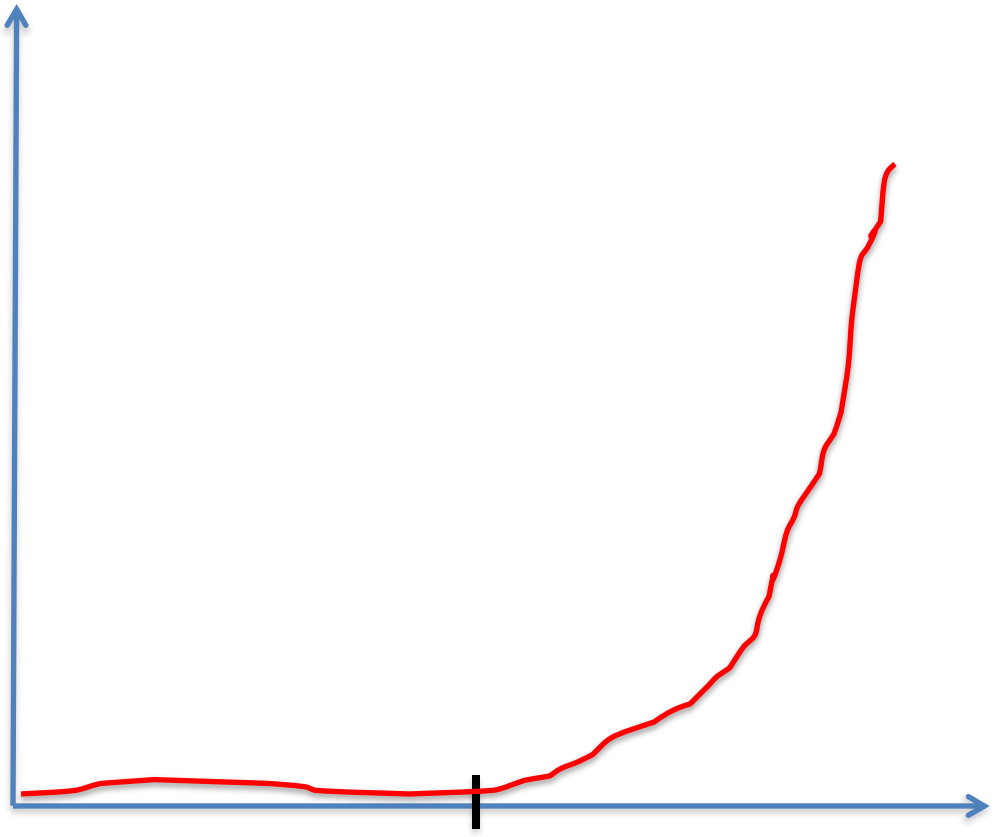
# Another comment

## Discomfort with proofs

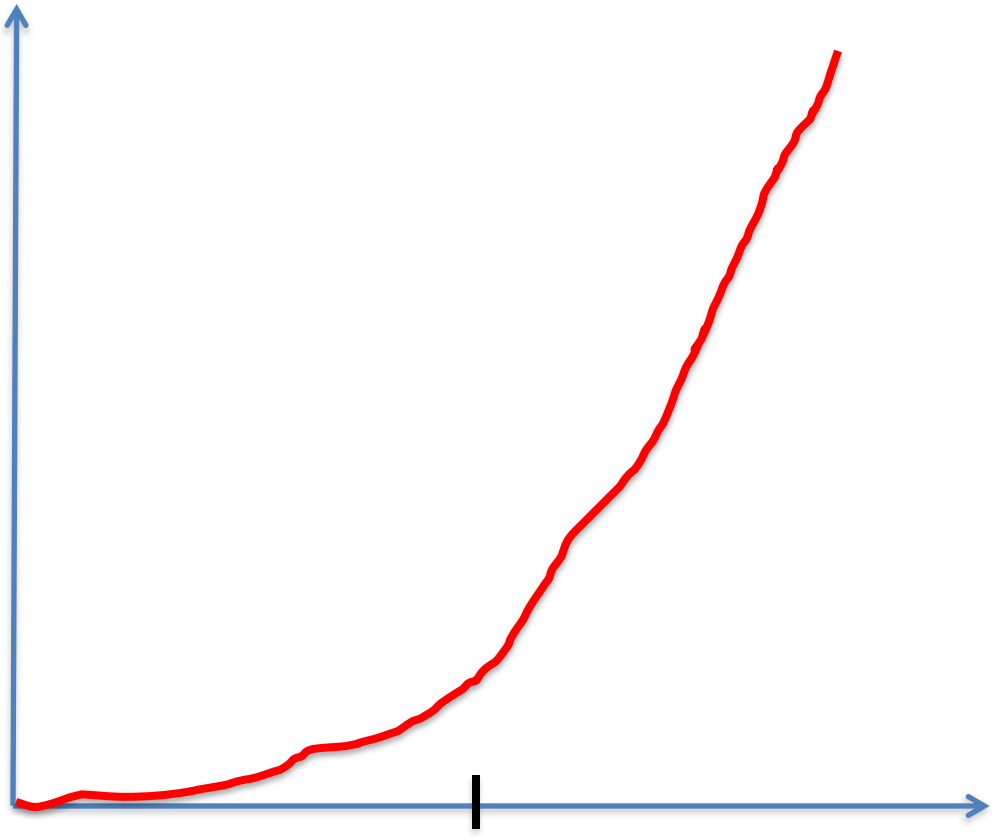
I will not cover proof basics in class anymore

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

# Lecture pace (until Fall 18)

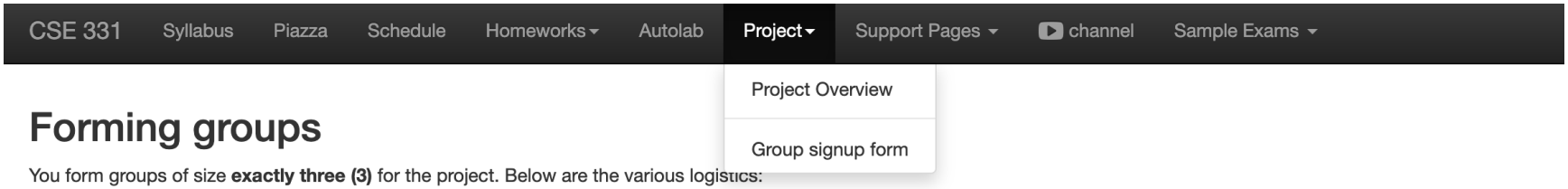


# Lecture pace



# Register your project groups

## Deadline: Friday, Sep 20, 11:59pm




## Forming groups

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

- 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) group members in your group.

> **</> Note**
>
> Note that if you pick th… …nnot submit as a group of size two. If …
>
> Also, if you form a gro…

If you miss this deadline then you will get a ZERO on the ENTIRE project

  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 20**.

# What happens in real life


Preferences

NRMP
National Resident Matching Program

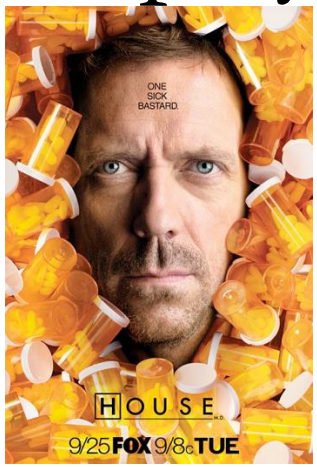
Information

NRMP
National Resident Matching Program

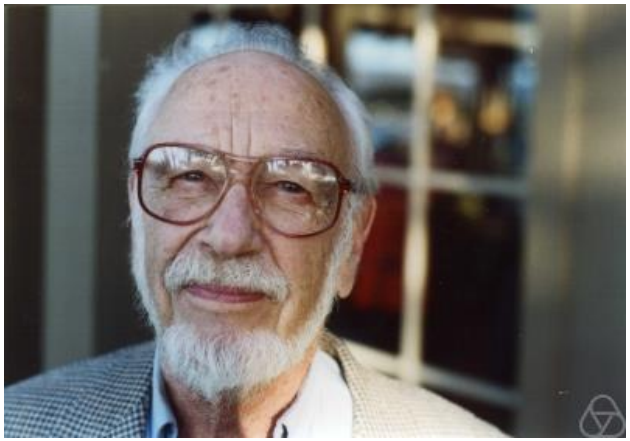
Preferences

NRMP
National Resident Matching Program

# NRMP plays matchmaker




# Stable Matching Problem



David Gale

Lloyd Shapley*

# Matching Employers & Applicants

**Input:** Set of employers (E)
Set of applicants (A)
Preferences

**Output:** An assignment of applicants to employers that is "stable"

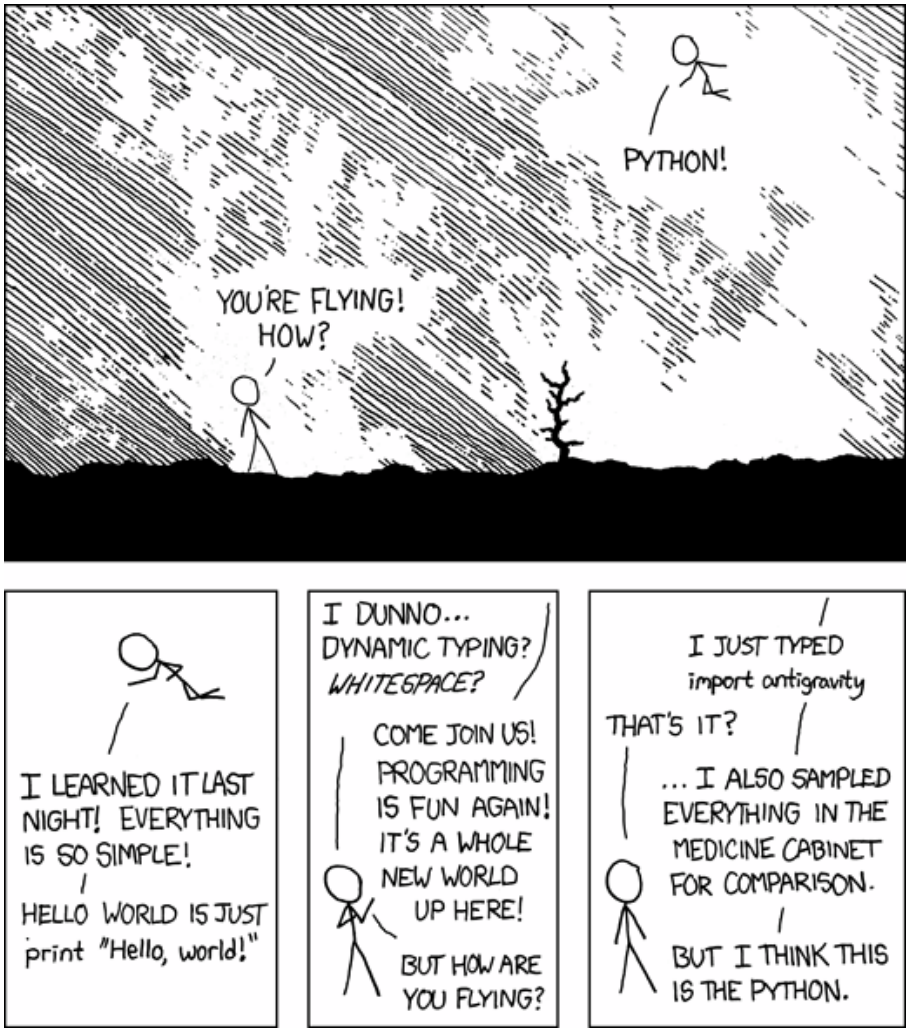
For every x in A and y in E such that x is **not** assigned to y, either

(i) y prefers *every* accepted applicant to x; or

(ii) x prefers her employer to y

# Questions/Comments?

# Simplicity is good




http://xkcd.com/353/

# Questions to think about

1) How do we specify preferences? Preference lists

2) Ratio of applicant vs employers 1:1

3) Formally what is an assignment? (perfect) matching

4) Can an employer get assigned > 1 applicant? NO

5) Can an applicant have > 1 job? NO

6) How many employer/applicants in an applicants/employers preferences? All of them

7) Can an employer have 0 assigned applicants? NO

8) Can an applicant have 0 jobs? NO

# Lost in Notation….

| Date | Topic | Notes |
|---|---|---|
| Mon, Aug 26 | Introduction F24 F23 F22 F21 F19 | Syllabus Walkthrough: |
| Tue, Aug 27 | | **(HW 0 out)** |
| Wed, Aug 28 | Let's do a proof! F24 F23 F22 F21 F19 | Week 1 recitation notes |
| Fri, Aug 30 | Halting is Unsolvable F24 F23 F22 F21 F19 $x^2$ | |
| Mon, Sep 2 | **No Class** | Labor Day |
| Tue, Sep 3 | | **(HW 0 in)** |
| Wed, Sep 4 | Perfect Matchings F23 F22 F21 F19 F18 F17 $x^2$ | [KT, Sec 1.1] |

# Non-feminist reformulation

n men

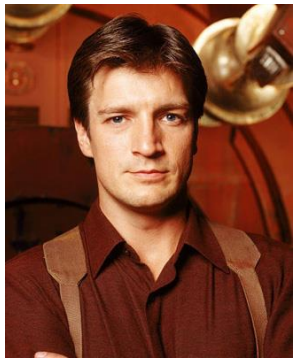
n women

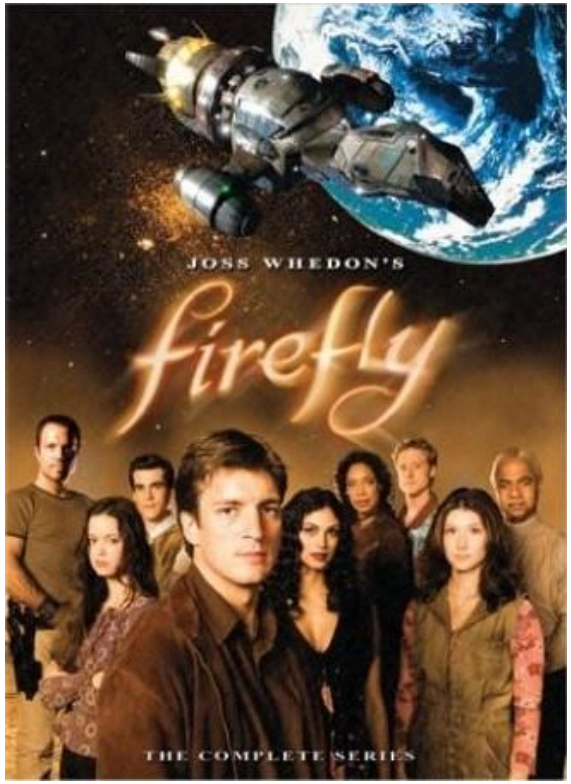
Each with a preference list

Match/marry them in a "stable" way

# On matchings

Mal



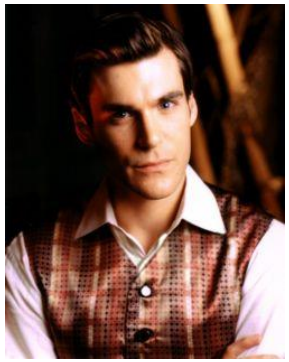



Inara

Wash

Zoe

Simon



Kaylee

# Is this a valid matching?

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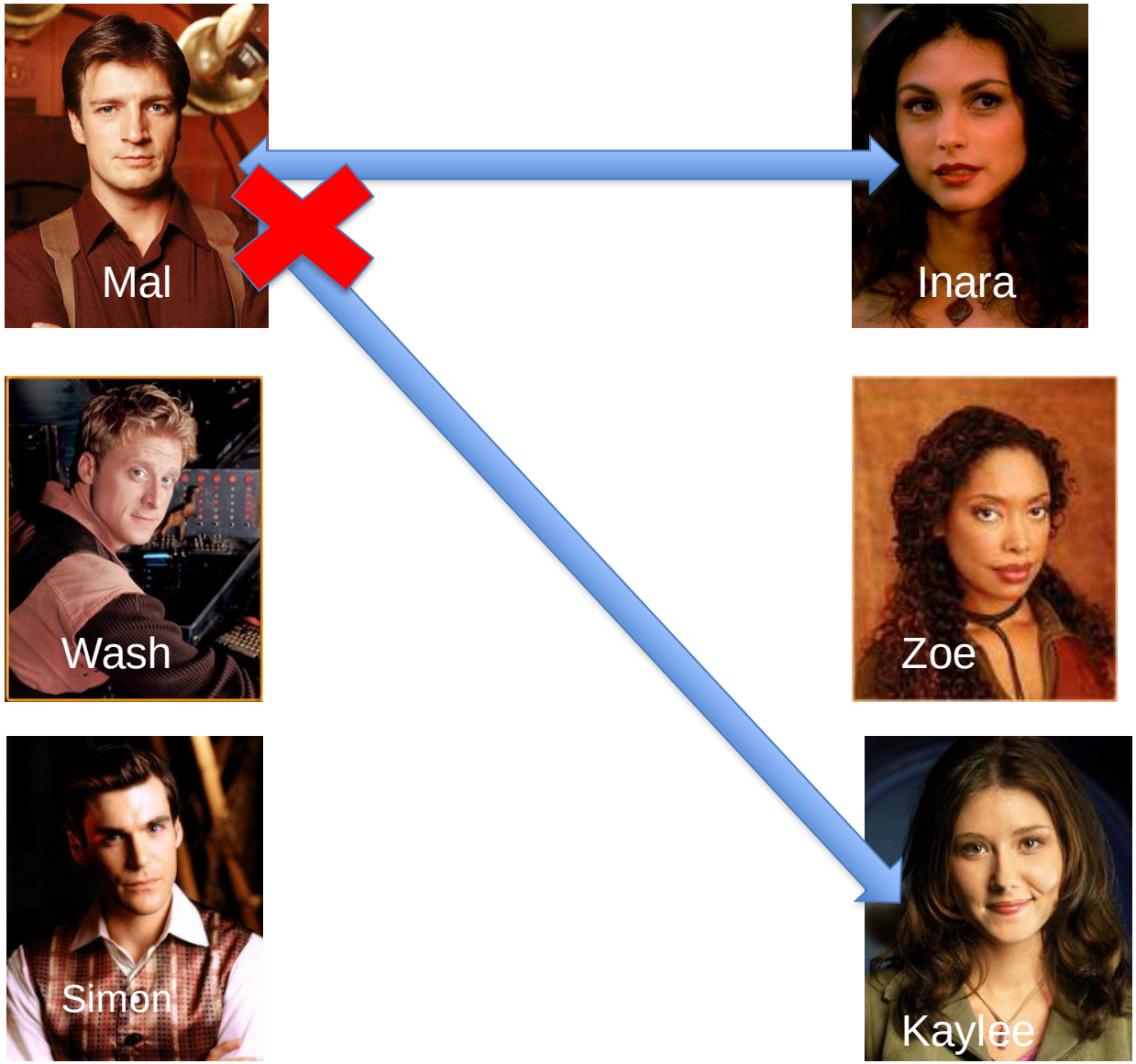
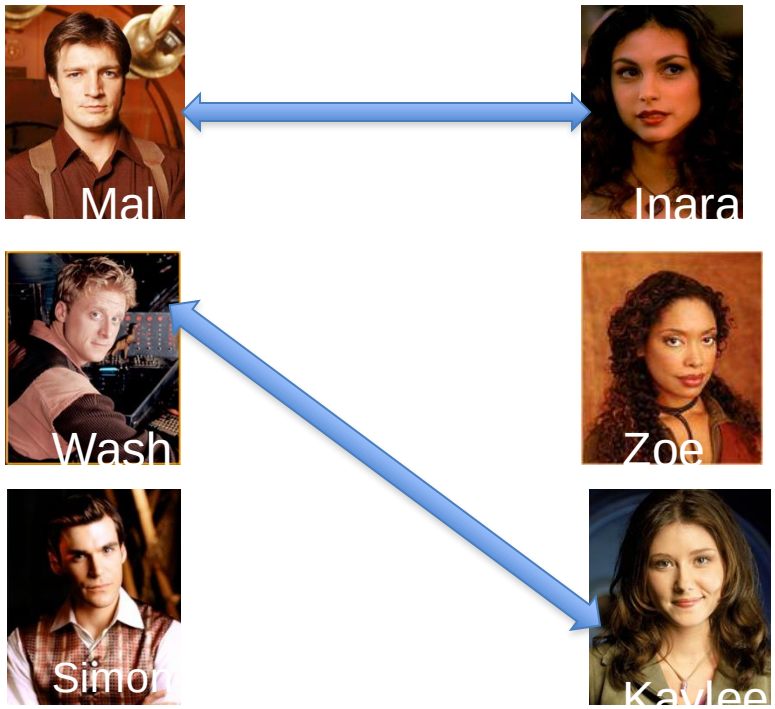
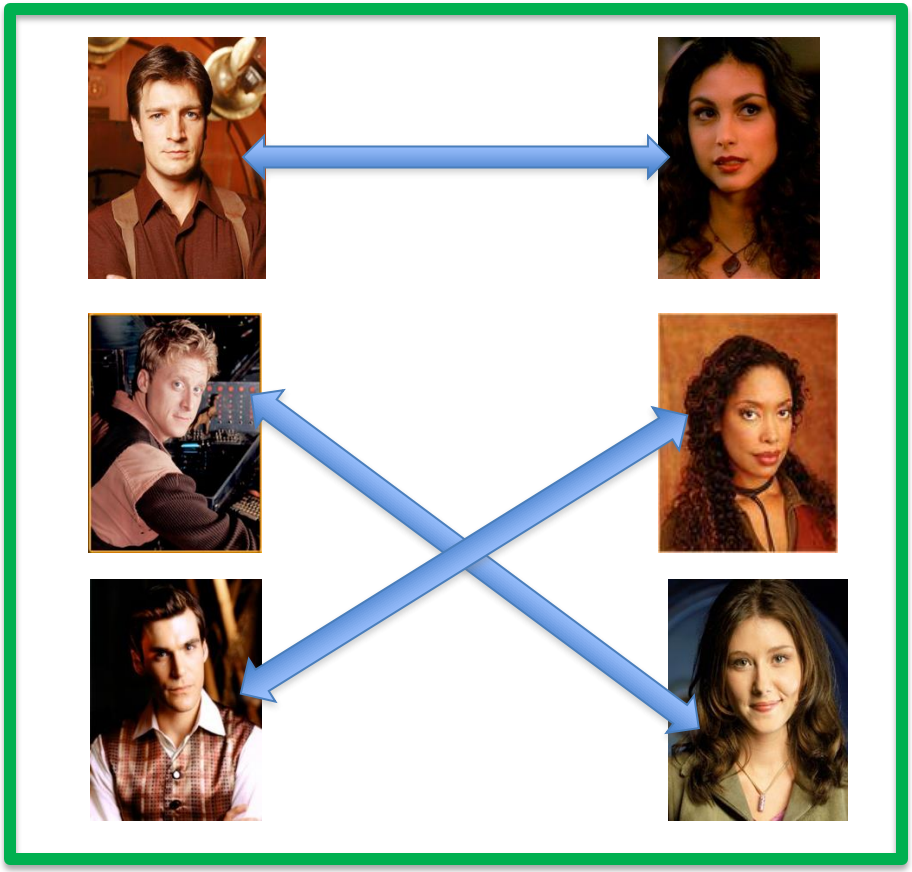


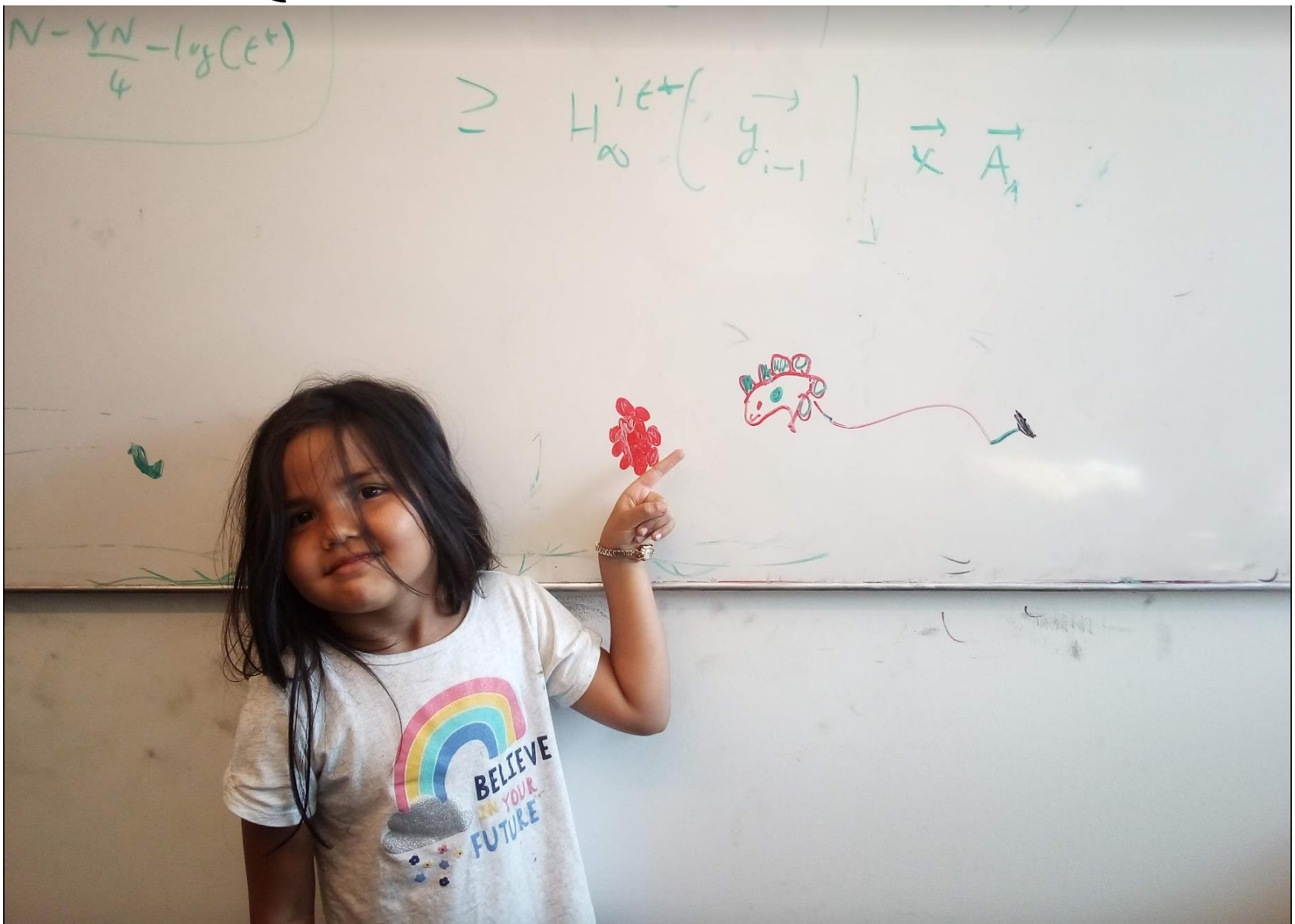
# Is this a valid matching?

# Which one is a perfect matching?



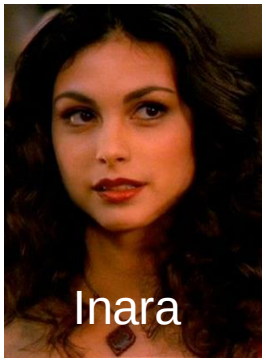



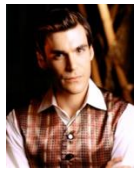
# Questions/Comments?

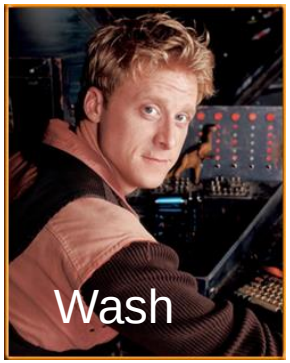


# On to the board…

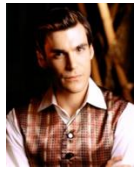
# Preferences

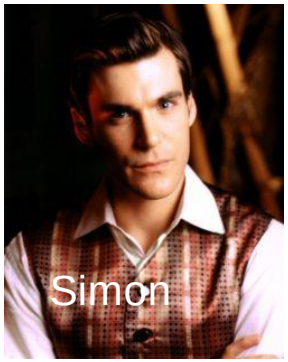



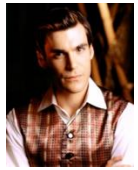








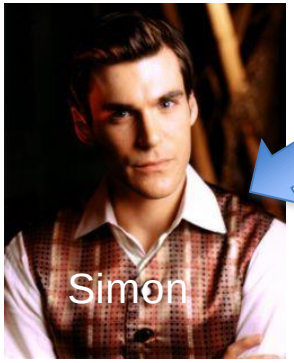


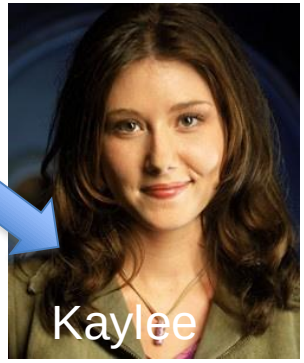


# Instability








# Back to the board…