Lecture 3

CSE 331

Sep 3, 2021

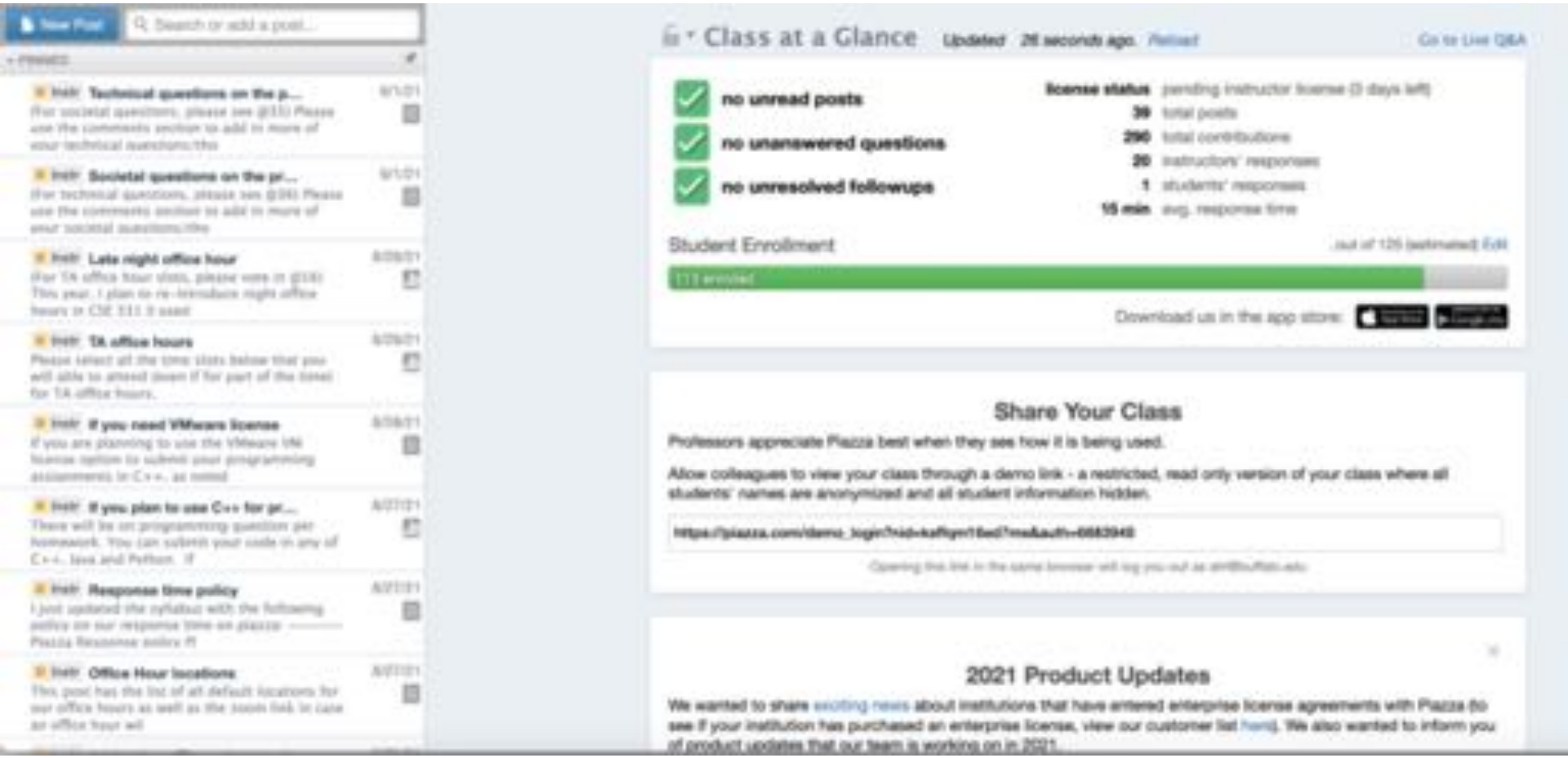
Please have a face mask on

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

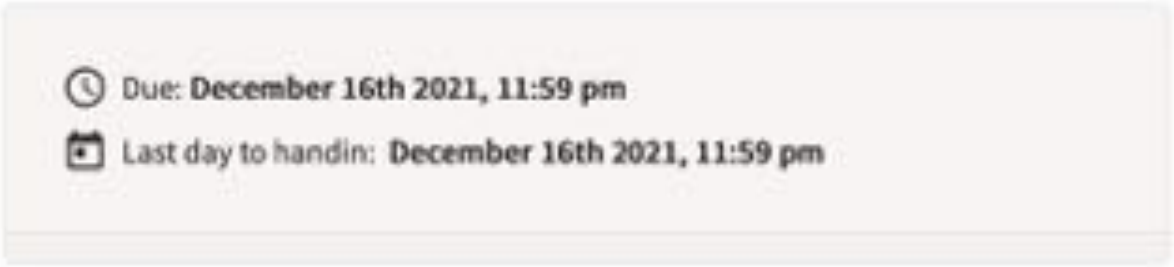
Enroll on Piazza



https://piazza.com/buffalo/fall2021/cse331/

Read the syllabus CAREFULLY!

Syllabus Quiz



No graded material will be handed back till you pass the syllabus quiz!

Academic Integrity

Question 1: Sharing my answers to this syllabus quiz with other 331 students

- ○ Is OK if I do it to help out a friend
- ○ It does not matter since there is no grade attached with it
- ○ Is an academic integrity violation and should not be done
- ○ Is an academic integrity violation but I can take the chance

Please do keep on asking Qs!

The only bad question is the one that is not asked!

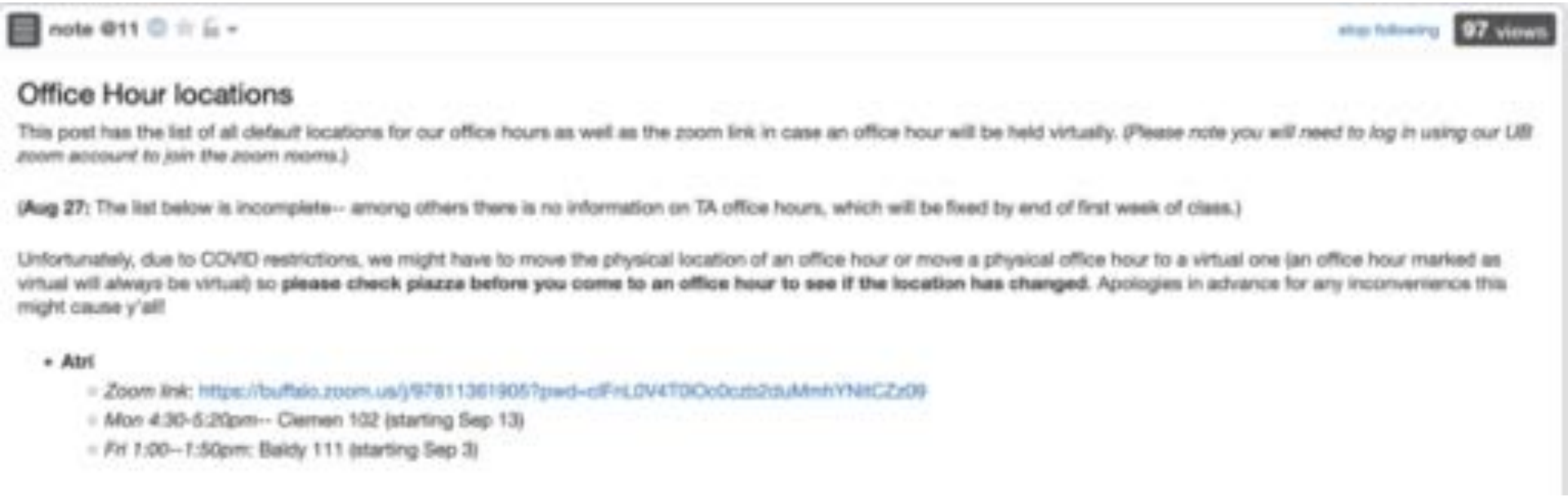
TA office hours

Finalized by today

Details will be posted on piazza

My office hour today

In Baldy 111



note @11

97 views

Office Hour locations

This post has the list of all default locations for our office hours as well as the zoom link in case an office hour will be held virtually. (Please note you will need to log in using our UB zoom account to join the zoom rooms.)

(**Aug 27**: The list below is incomplete-- among others there is no information on TA office hours, which will be fixed by end of first week of class.)

Unfortunately, due to COVID restrictions, we might have to move the physical location of an office hour or move a physical office hour to a virtual one (an office hour marked as virtual will always be virtual) so **please check piazza before you come to an office hour to see if the location has changed.** Apologies in advance for any inconvenience this might cause y'all!

- **Atri**
  - Zoom link: https://buffalo.zoom.us/j/97811361905?pwd=cllFnL0V4T0lOo0czts2cluMmhYNitCZz09
  - Mon 4:30-5:20pm-- Clemen 102 (starting Sep 13)
  - Fri 1:00--1:50pm: Baldy 111 (starting Sep 3)

Two comments on Programming

Programming is worth about 16% of your final grade

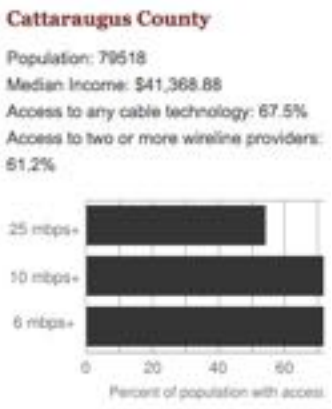
Algorithm design/proofs are worth about 80% of your final grade

Invest your time wisely

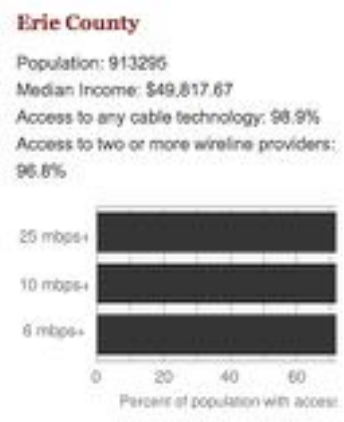
331 is not the place to learn a new language!

Questions/Comments?

Make broadband more available



Say you are tasked to come up with the infrastructure



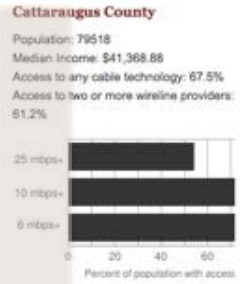
Make broadband more available

Input requirements

Where are the customers located?

What are the bandwidth requirements?

How is the input represented?



What objective are we optimizing?

How should the connections be configured?

Output requirements

Problem Definition

Where should we lay down the physical stuff?

What algorithm should be use to do this?

Algorithm Design

Is Internet a right?

Environmental factors

Security/Privacy

Where is funding coming from?

Income inequality in population

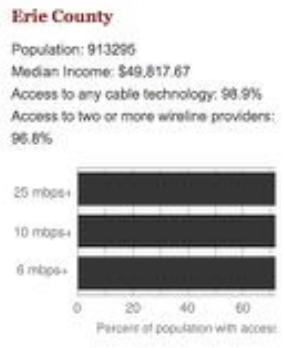
Get regulatory approval
Hire people

Get access to physical space

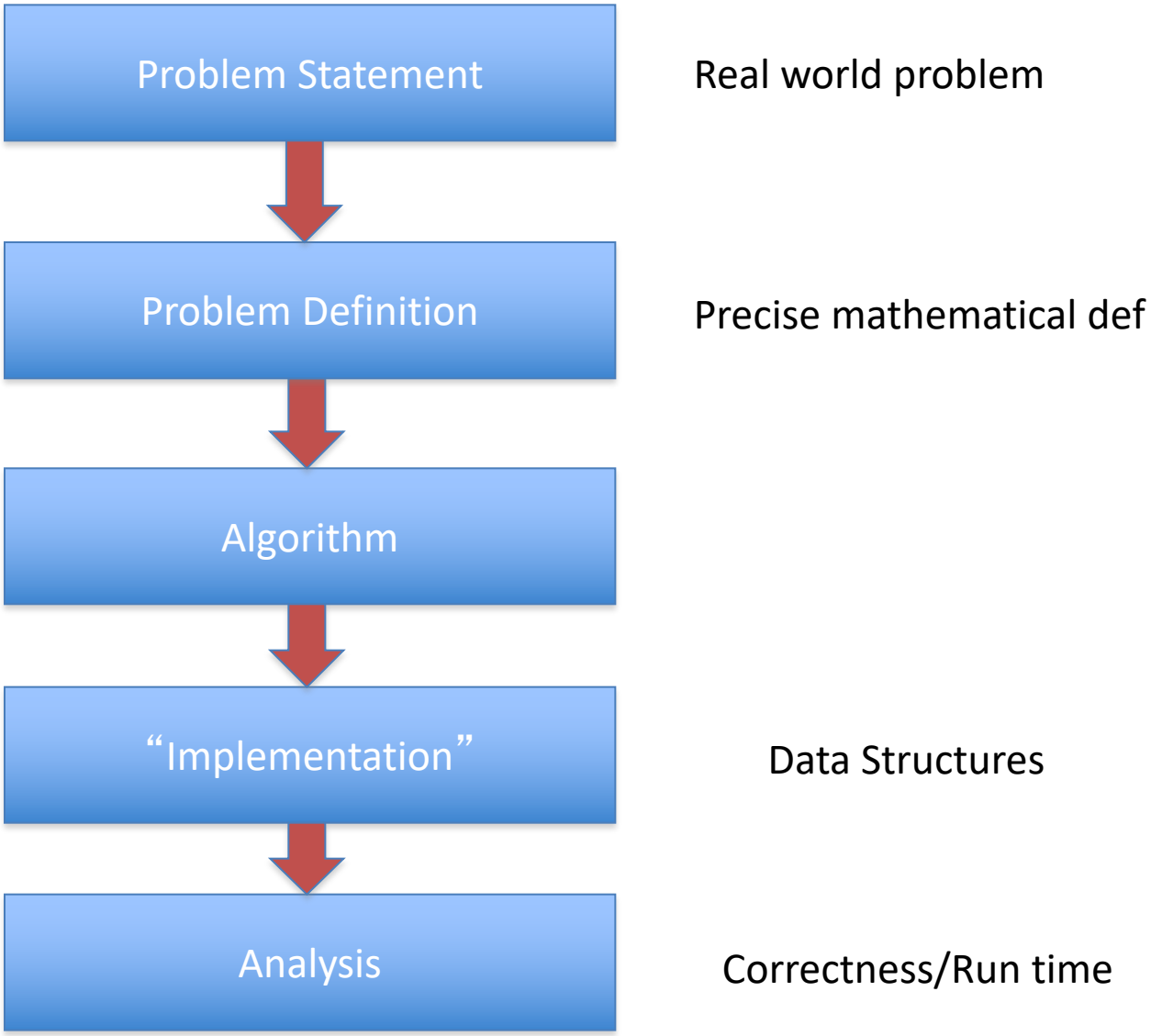
Outreach

Implement the scheme

How should we do testing and maintenance?

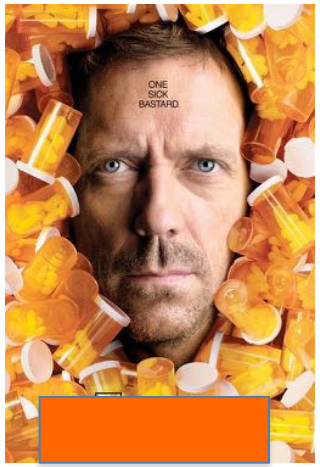


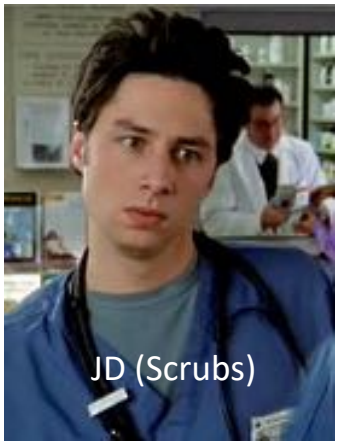
Main Steps in Algorithm Design



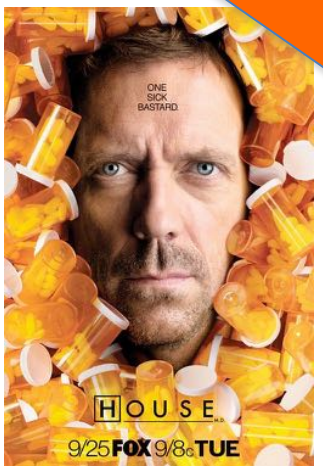
National Resident Matching

(Screen) Docs are coming to BUF

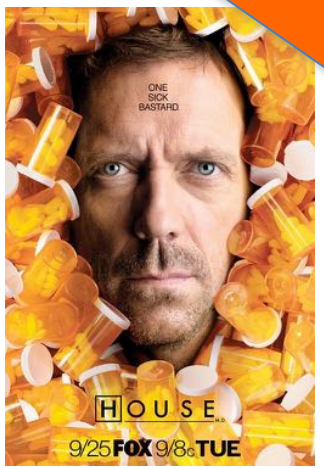




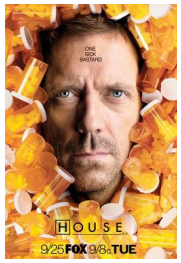
What can go wrong?



The situation is unstable!



What happens in real life



Preferences

NRMP
National Resident Matching Program

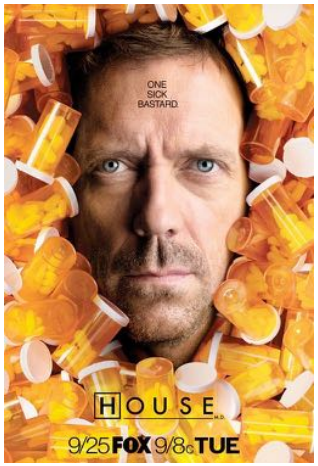
Information

NRMP
National Resident Matching Program

Preferences

NRMP
National Resident Matching Program

NRMP plays matchmaker



Stable Matching Problem

David Gale

Lloyd Shapley

Questions/Comments?

Matching Employers & Applicants

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

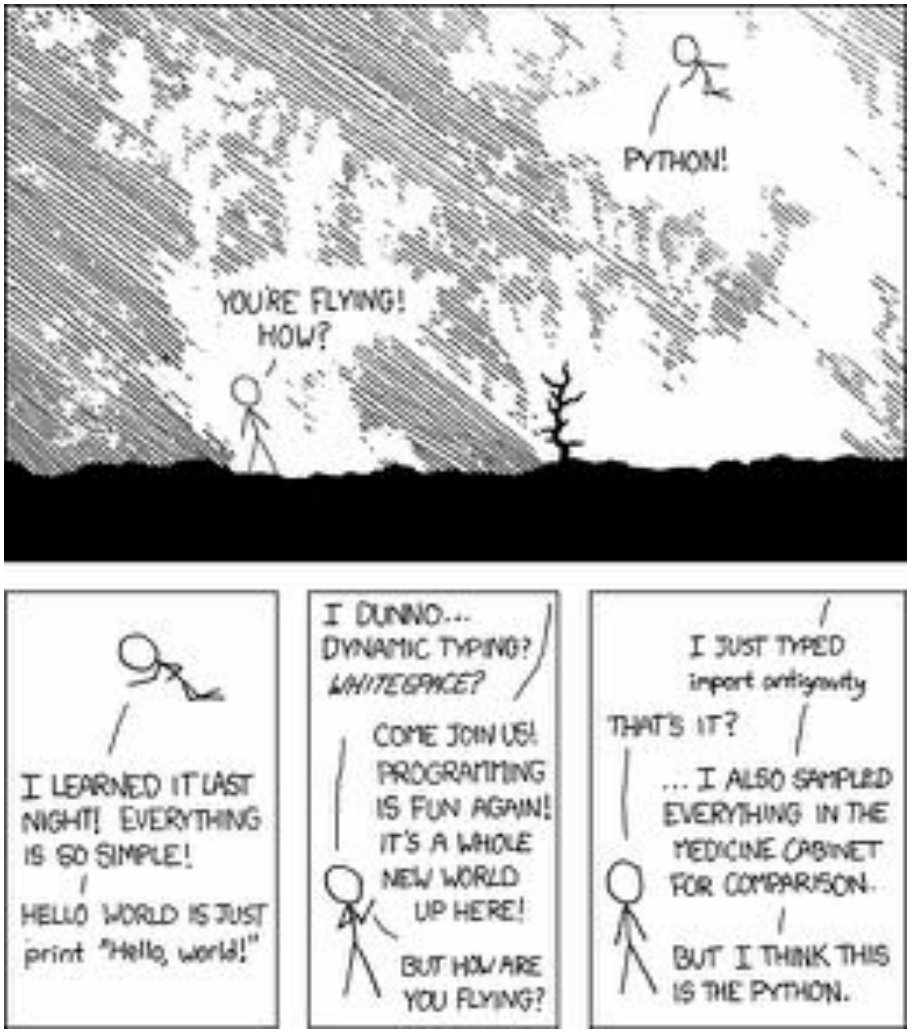
Output: An assignment of applicants to employers that is "stable"

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

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….

CSE 331 Fall 2021 Schedule

Previous schedules: 2021 (Spring), 2020, 2019, 2018, 2017, 2016, 2014, 2013, 2012, 2011, 2010 and 2009.

Future Lectures

The topics for lectures in the future are tentative and subject to change. Also the links for future lectures are from Fall 2017, Fall 2018 and Fall 2019. Recordings of Fall 2021 lectures are also available from UBLearns.

Date	Topic	Notes
Mon, Aug 30	Introduction	
Wed, Sep 1	Main Steps in Algorithm Design	(HW 0 out) Week 1 recitation notes
Fri, Sep 3	Stable Matching Problem	[KT, Sec 1.1]

Questions/Comments?

Non-feminist reformulation

n men

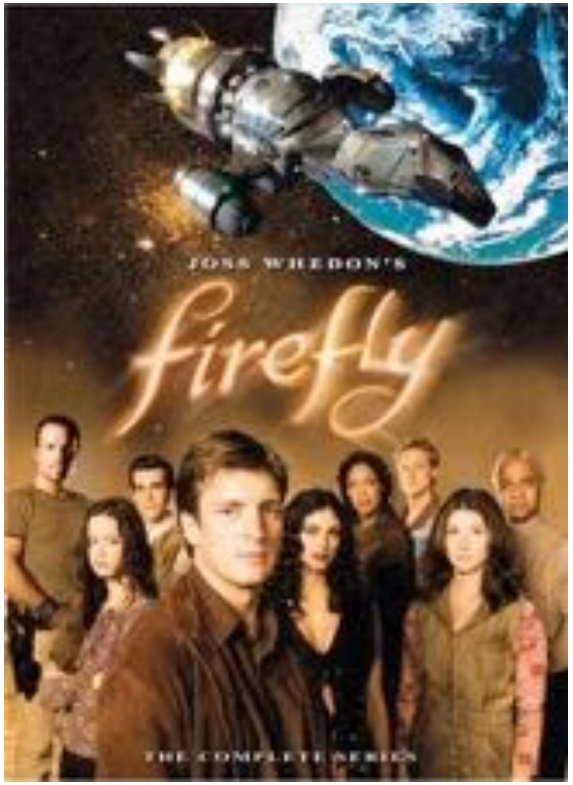
n women

Each with a preference list

Match/marry them in a “stable” way

On matchings

Mal

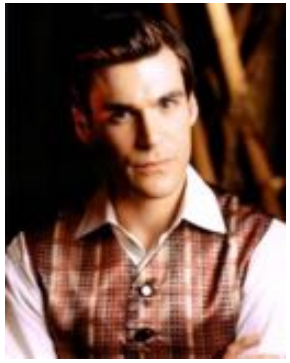


Inara

Wash

Zoe

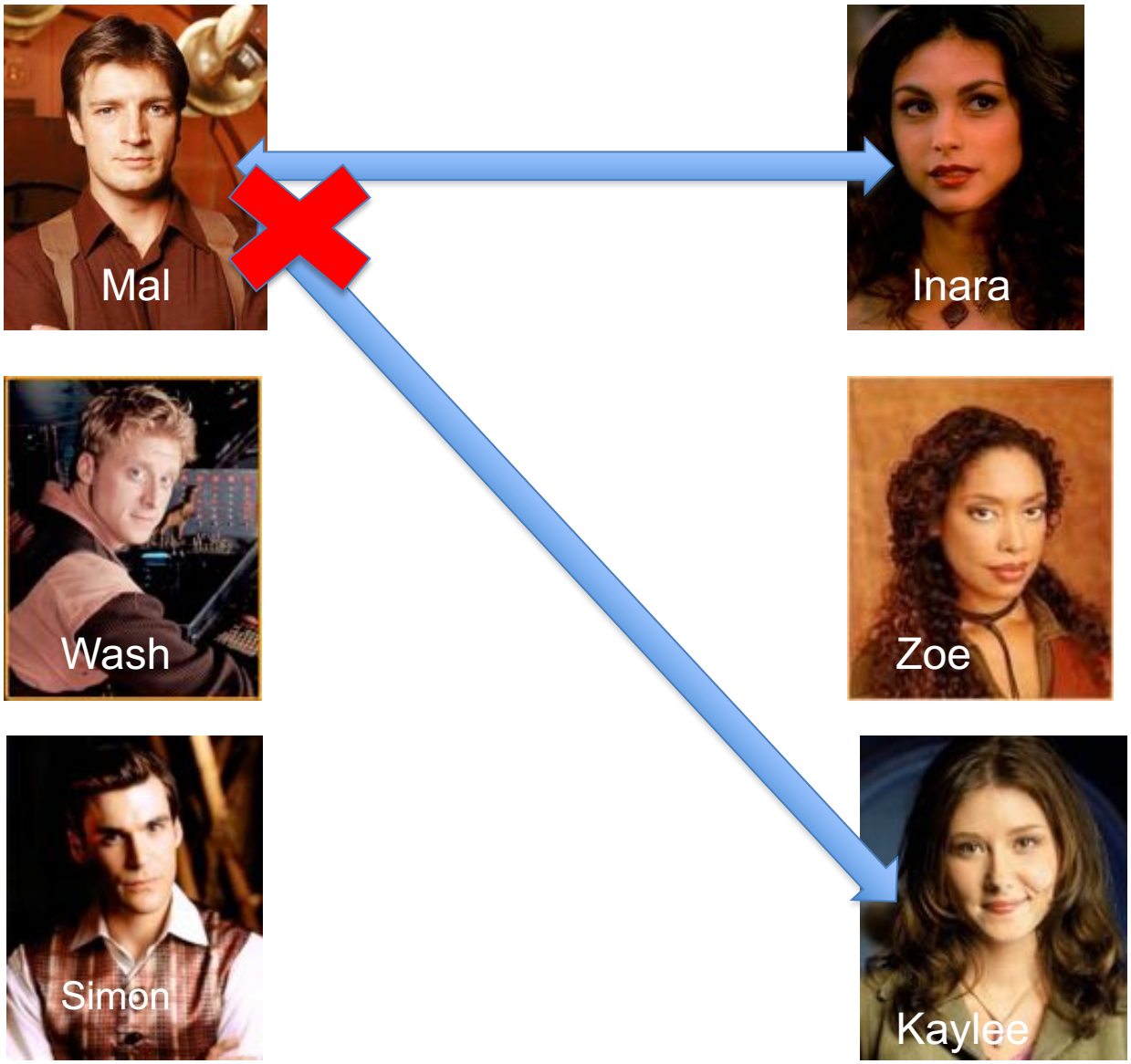
Simon



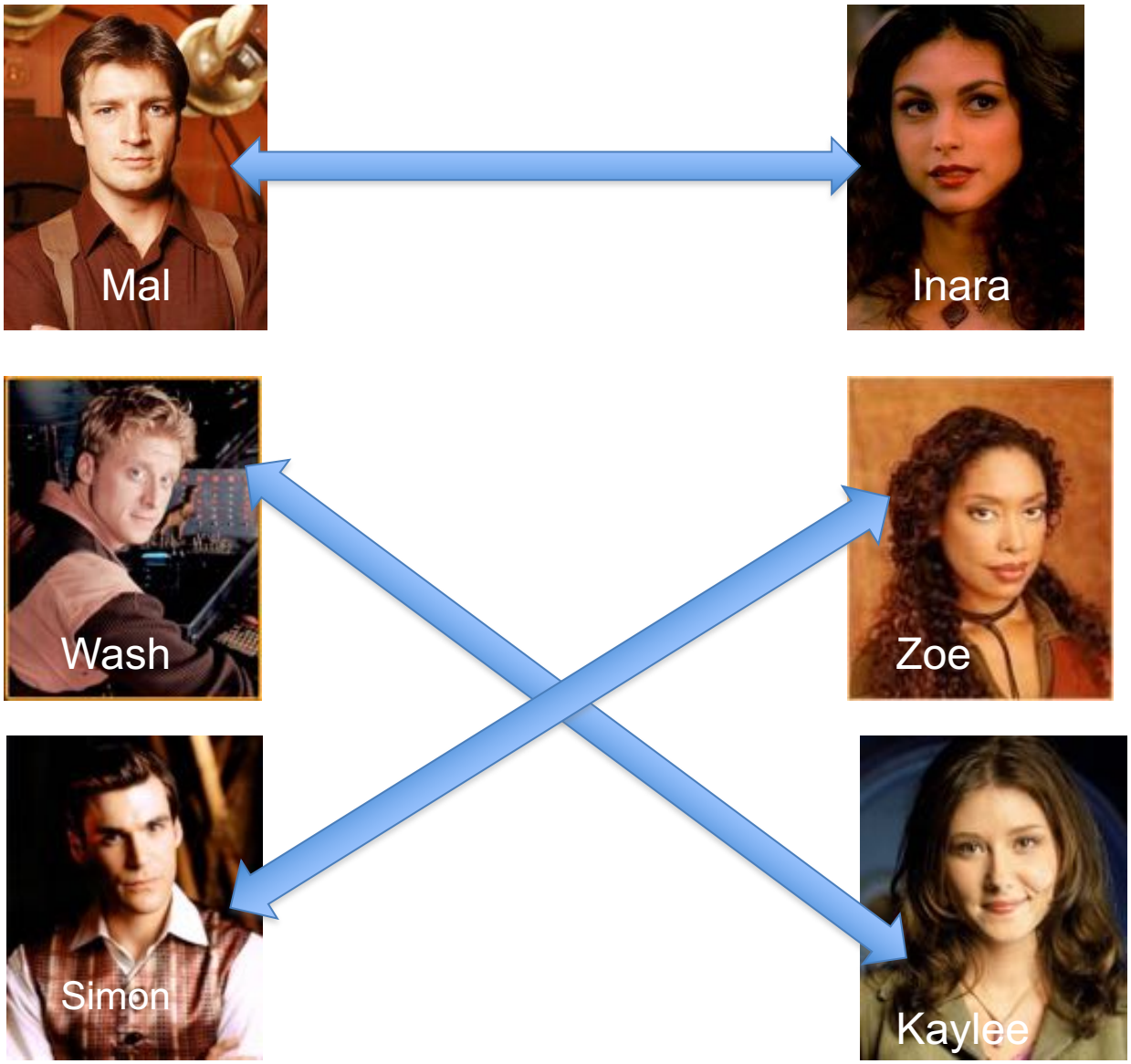
Kaylee

Is this a valid matching?

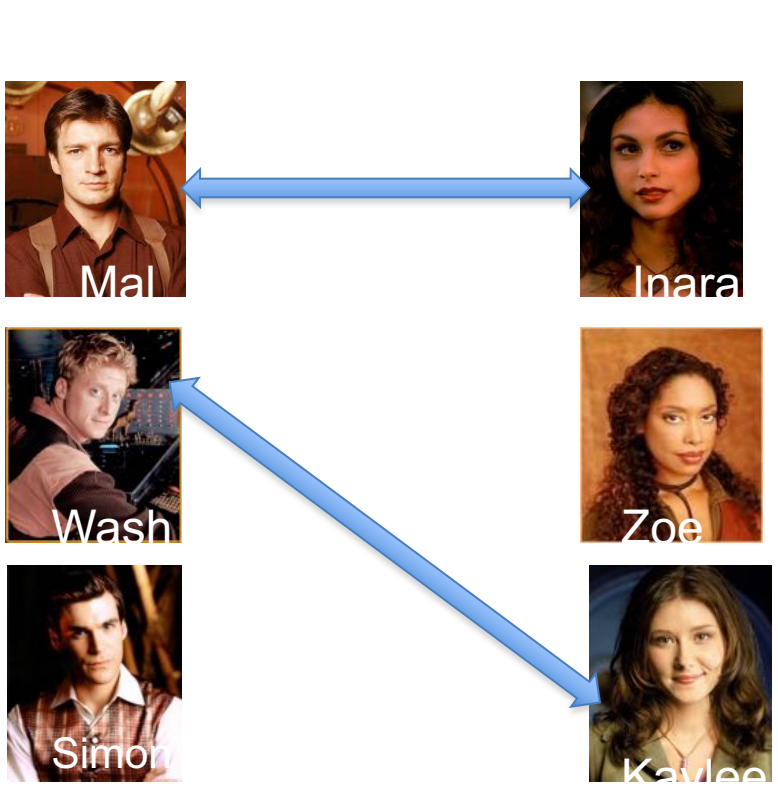
Is this a valid matching?

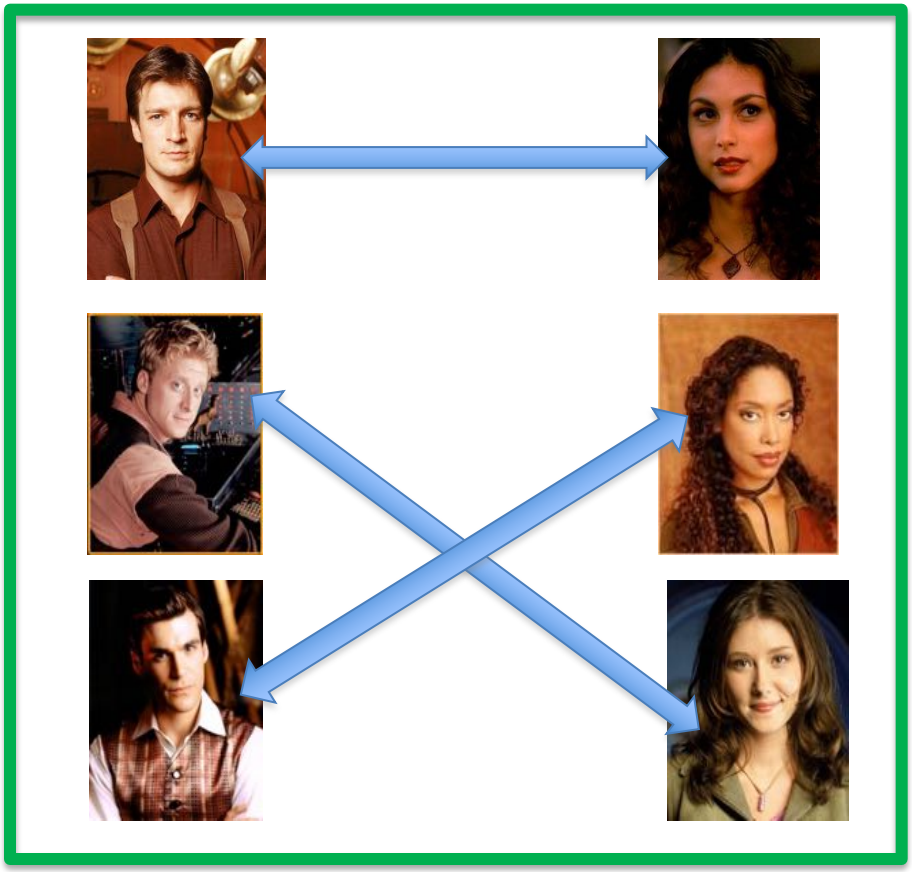


Is this a valid matching?



Which one is a perfect matching?





Work things out on paper