Lecture 5

CSE 331

Sep 8, 2017

HW 1 posted

Homework 1

Due by **11:00am, Friday, September 15, 2017**.

Make sure you follow all the homework policies.

All submissions should be done via Autolab.

Some Questions on Stable Matching

Sample Problem

The Problem

Decide whether the following statement is true or false:

In every Stable Marriage problem instance where a man m and woman w have each other as their least preferred partner, the following is true. There is no stable matching for

Take note of the many(!) notes

! PDF only please

Autolab might not be able to display files in formats other than PDF (e.g. Word cannot be displayed). **If Autolab cannot display your file, then you will get a zero (0) on the entire question.**

Grading Guidelines

We will follow the usual grading guidelines for non-programming questions. Here is a high level grading rubric specific to this problem:

1. `Proof idea`: 23 points for a counterexample idea explaining the insight behind why you think the property does not holds.
2. `Proof details`: 22 points for a complete description of a counterexample and a complete proof for why the given counter example does not have any stable schedule.

! Note

If you do not have separated out proof idea and proof details, you will get a zero(0) irrespective of the technical correctness of your solution..

Templates

[Download LaTeX template.] [Download Microsoft Word template.]

! Note

Your must explicitly list your sources and collaborators when you upload your submission to Autolab. Note that you can only used one of the five allowed sources. If you have used a source that is not allowed, please do **not** submit your homework. If you did not consult any source or did not collaborate with anyone just say None.
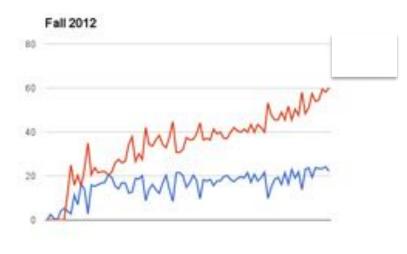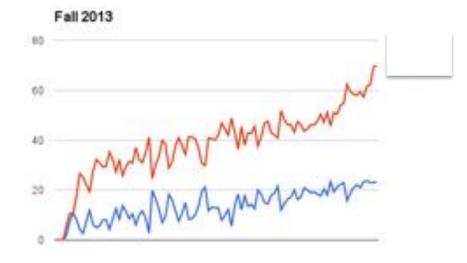
Small changes
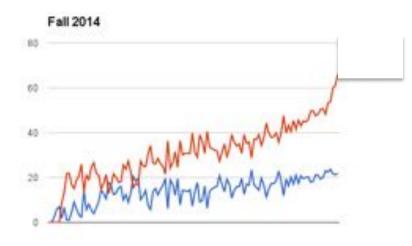
We might tweak the autograder a bit over the weekend

These changes should not affect your score

Post questions on Piazza!
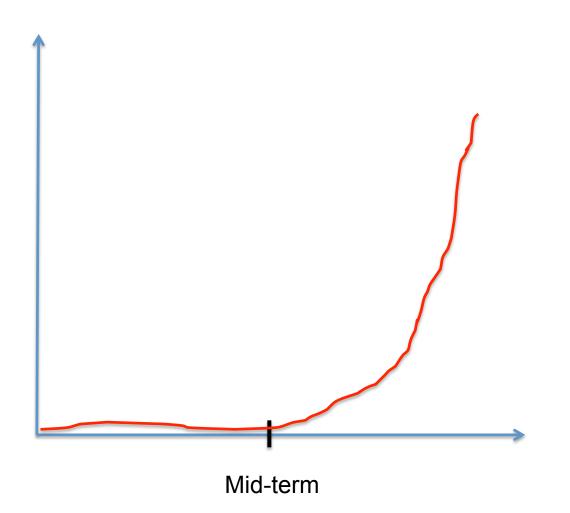
Can you guess the correlation?
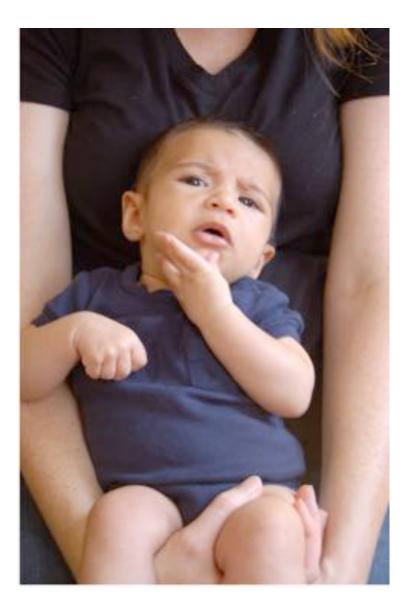
Another comment

Discomfort with proofs

I will not cover proof basics in class

Please read support pages and talk to us in person if you need help

Lecture pace

Mid-term

Questions/Comments?

Gale-Shapley Algorithm

Intially all men and women are free

While there exists a free woman who can propose

> Let w be such a woman and m be the best man she has not proposed to
>
> w proposes to m
>
> If m is free
>
> > (m,w) get engaged
>
> Else (m,w') are engaged
>
> > If m prefers w' to w
> >
> > > w remains free
> >
> > Else
> >
> > > (m,w) get engaged and w' is free

Output the set S of engaged pairs as the final output

Today's agenda

Run of GS algorithm on an instance

Prove correctness of the GS algorithm
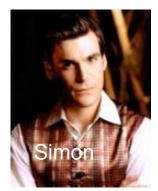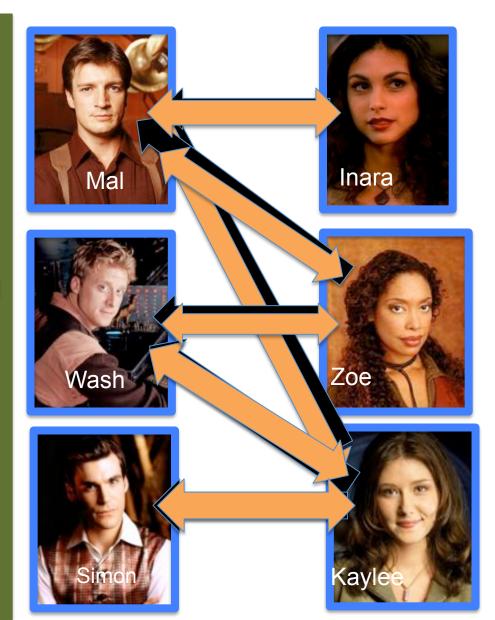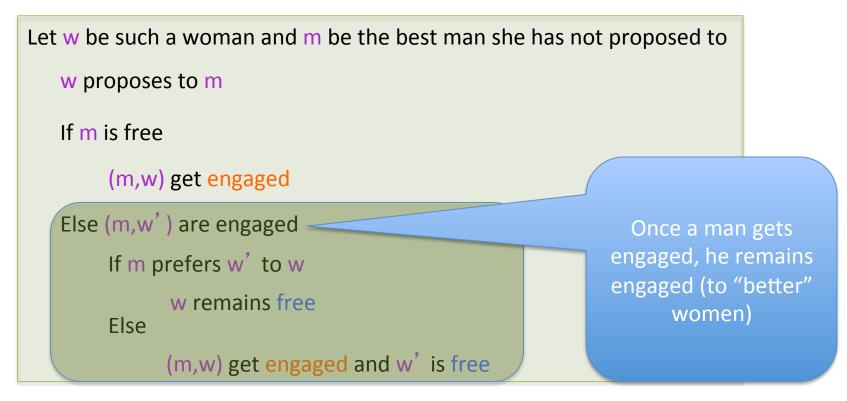
Preferences

GS algorithm: Firefly Edition

Observation 1

Intially all men and women are free

While there exists a free woman who can propose

Let w be such a woman and m be the best man she has not proposed to

w proposes to m

If m is free

(m,w) get engaged

Else (m,w') are engaged

If m prefers w' to w

w remains free

Else

(m,w) get engaged and w' is free

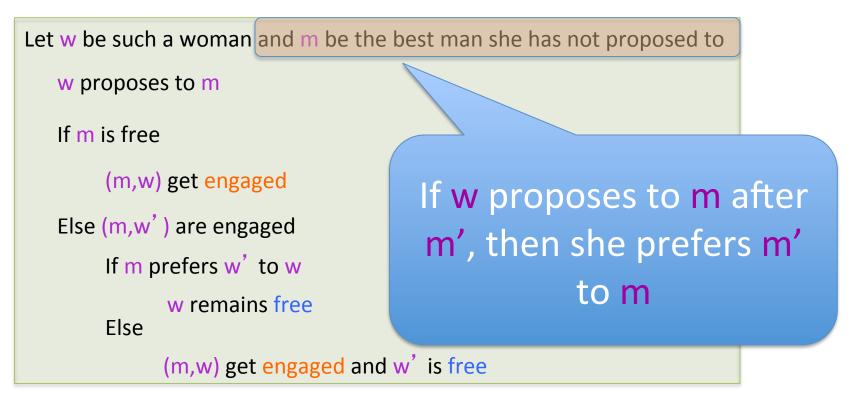Once a man gets engaged, he remains engaged (to "better" women)

Output the engaged pairs as the final output

Observation 2

Intially all men and women are free

While there exists a free woman who can propose

Let w be such a woman and m be the best man she has not proposed to

    w proposes to m

    If m is free

        (m,w) get engaged

    Else (m,w') are engaged

        If m prefers w' to w

            w remains free

        Else

            (m,w) get engaged and w' is free

If w proposes to m after m', then she prefers m' to m

Output the set S of engaged pairs as the final output

Questions/Comments?

Why bother proving correctness?

Consider a variant where any free man **or** free woman can propose

Is this variant any different? Can you prove it?

GS' does not output a stable marriage