

HOMEWORK 1

Due Friday, September 14, 2012 by 1:15pm in class

IMPORTANT: Please submit each problem separately, i.e. each problem should begin on a new page and only the pages for one problem should be stapled together. Failure to do so might result in some problem(s) not being graded.

For general homework policies and our suggestions, please see the homework policy document.

Make sure you look at the grading rubric (which should be up on the blog by the weekend) before you start writing up your solutions.

No collaboration is allowed on the first problem.

1. (**You must work on this problem on your own: NO collaboration is allowed**)(20 + 20 = 40 points)

- (a) 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 the instance where (m, w) are matched.

If you state true then you will have to formally argue why the statement is correct. If you state false, then you have give a counter-example.

- (b) Exercise 2 in Chapter 1.

2. (45 points) Exercise 3 in Chapter 1.

3. (15 points) For every even $n \geq 2$, show that there is a stable matching instance on n men and n women such that the instance has at least $2^{n/2}$ distinct stable matchings.

To get **full credit**, you should be able to present an instance for *every* even $n \geq 2$.

(*Hint:* We have seen such an instance for $n = 2$ in class. Try and extend the instance to every even n .)