

## EECS 660 Homework 1 Instructions

The goal of this homework is to implement the stable matching algorithm in the *Algorithm Design* book presented on page 6. The pseudo code is as follows:

```
Initially all  $m \in M$  and  $w \in W$  are free
While there is a man  $m$  who is free and hasn't proposed to
every woman
    Choose such a man  $m$ 
    Let  $w$  be the highest-ranked woman in  $m$ 's preference list
    to whom  $m$  has not yet proposed
    If  $w$  is free then
         $(m, w)$  become engaged
    Else  $w$  is currently engaged to  $m'$ 
        If  $w$  prefers  $m'$  to  $m$  then
             $m$  remains free
        Else  $w$  prefers  $m$  to  $m'$ 
             $(m, w)$  become engaged
             $m'$  becomes free
        Endif
    Endif
Endwhile
Return the set  $S$  of engaged pairs
```

1. Create a python file named “stable\_matching\_username#”, with **username#** corresponding to your **KU online username with your initials**. For example, if my online username is c935h465, I would create a python file named “stable\_matching\_c935h465”.
2. Your program should be able to run from the console using the command:

```
python stable_matching_ID.py input.txt
```

where the arguments are your program and the input file. **Your program should write to stdout, not an output file.** I will be using **Python 3** to grade your assignments.

3. Your program should read in an input text file that contains the number of men and women to be paired, the preferences of each man, and the preferences of each woman. For example, for a stable matching problem involving 3 men and 3 women, the input file should have the following format:

3

1,2,3

2,1,3

3,1,2

1,2,3

2,3,1

3,2,1

The first argument represents the number of men and women in the stable matching problem. In this case, there are 3 men and 3 women. The second argument represents the preferences of each man. In this example, the first man has preference “1,2,3”, the second man has preference “2,1,3”, and the last man has preference “3,1,2”. The last argument represents the preferences of each woman. In this case, the first woman has preference “1,2,3”, the second woman has preference “2,3,1”, and the last woman has preference “3,2,1”. See the input files for more examples.

4. The stable matching should be sorted by the IDs of each man in the pair. For example,

2, 1

1, 2

would be considered an incorrect stable matching because the first row should be “1, x” (x is the ID of a woman), whereas the following output would be an acceptable stable matching.

1, 2

2, 1

5. You can further test your program by creating input text files following the format of the sample input text files provided.

6. Please submit your homework file(.py file) on Blackboard

7. If you have any questions, please feel free to email me at [seanhung0621@ku.edu](mailto:seanhung0621@ku.edu) or [j0861791@ku.edu](mailto:j0861791@ku.edu). We will try to get back to you as quickly as possible.

8. **The submission deadline is Feb 14<sup>th</sup> 2020 11:59PM.** Please refer to the course syllabus for late penalty policy.