

Programming Assignment #3

Due: 4/18/2012

Total 100 points.

In this assignment, you will develop a program named “match” to be used by a dating service to form couples. Given the number of gentlemen, the number of ladies, and a list of acceptable pairings, your program should use a network flow based approach to form as many couples as possible.

Let m be the # of gentlemen and n be the # of ladies. In this assignment, each gentleman is represented by an index between 1 and m , and each lady is represented by an index between 1 and n . The inputs are specified in a text file in the format below:

```
<# of gentlemen>
<# of ladies>
<gentleman in 1st acceptable pairing> <lady in 1st acceptable pairing>
<gentleman in 2nd acceptable pairing> <lady in 2nd acceptable pairing>
...
<gentleman in last acceptable pairing> <lady in last acceptable pairing>
```

The output file of your program should include the number of couples formed and a list of those couples.

For example, the following input file represents a case with 3 gentlemen, 4 ladies and 6 potential pairings.

```
3
4
1 1
1 2
2 2
3 1
3 3
3 4
```

The best matching solution consists of 3 pairs and one feasible solution is that gentleman 1 is matched to lady 1, gentleman 2 is matched to lady 2, and gentleman 3 is matched to lady 4. (Note that there are many other feasible solutions with 3 pairs.) The corresponding output file of your program is shown below:

```
3
1 1
2 2
3 4
```

Your program should be implemented in either C or C++. Please try your best to make your program fast and memory efficient. Several input files are posted. For submission, please email to the TA your source code and the output file for each input file. For each input file, please also report the runtime, and the processor model and clock frequency of the machine that you used.