Module 1 Graded Quiz

Due Aug 29, 2021 at 11:59pm **Points** 7 **Questions** 7
Available Aug 16, 2021 at 12am - Feb 14 at 11:59pm 6 months
Time Limit 120 Minutes

Attempt History

	Attempt	Time	Score
LATEST	Attempt 1	60 minutes	7 out of 7

Score for this quiz: **7** out of 7
Submitted Aug 26, 2021 at 11:41am
This attempt took 60 minutes.

Question 1

1 / 1 pts

Given the following preference lists of 3 males and 3 females, identify a stable matching produced by the execution of the propose-and-reject algorithm.

Males	**1st**	**2nd**	**3rd**
Alex	Alicia	Becky	Carey
Brad	Becky	Carey	Alicia
Chad	Alicia	Becky	Carey

Females	**1st**	**2nd**	**3rd**
Alicia	Chad	Brad	Alex

Becky	Alex	Chad	Brad
Carey	Alex	Brad	Chad

- (Alex,Alicia),(Brad,Carey),(Chad,Becky)

Correct!

- (Alex,Becky),(Brad,Carey),(Chad,Alicia)
- (Brad,Alicia),(Chad,Carey),(Alex,Becky)
- (Chad,Becky),(Alex,Carey),(Brad,Alicia)

Question 2

1 / 1 pts

Consider the following matching on preference lists, where * indicates a match:

Males	**1st**	**2nd**
Brad	Carey*	Becky
Chad	Carey	Becky*

Females	**1st**	**2nd**
Becky	Brad	Chad*
Carey	Chad	Brad*

How many unstable pairs are present in the matching indicated by the asterisks? Note that if P is the set of proposing men and A is the set of accepting women, then a pair is of the form (*p,a*) such that *p* is in P and *a* is in A. As such, every man/woman pair only counts as a single pair, i.e. (Chad,Becky) counts as a pair but (Becky,Chad) does not.

- 0
- Correct! 1
- 4
- 2

Question 3

1 / 1 pts

Given the following preference lists, how many stable matchings exist for this particular instance?

Males	**1st**	**2nd**
Alex	Alicia	Becky
Brad	Becky	Alicia

Females	**1st**	**2nd**
Alicia	Brad	Alex
Becky	Alex	Brad

- 4

Correct!

- (selected) 2
- 1
- 0

Question 4

1 / 1 pts

Suppose in an instance of the stable matching problem there are n men and $n + m$ women, where $m \geq 0$. Which of the following conclusions can be inferred?

Correct!

- (selected) The algorithm will terminate after at most n^2 iterations and each man will be matched to one woman.
- The algorithm will terminate after at most $n^2 + nm$ iterations and each man will be matched to one woman.
- The algorithm will terminate after at most n^2 iterations and each woman will be matched to one man.
- The algorithm will terminate after at most $n^2 + nm$ iterations and each woman will be matched to one man.

Question 5

1 / 1 pts

Suppose we want to modify the propose-and-reject algorithm to accommodate limited polygamy. Specifically, we want each woman to be

matched with two men. Consequently, there must be a set of $2n$ men and n women. Identify which of the following sets of additional modifications would achieve such a reduction and still maintain a guarantee of finding a stable matching.

i.) Allow each woman to maintain a total of two partners at all times and only allow a woman to trade up if she is currently matched with two men. In this case, an unstable pair would imply a man x prefers a woman y to his current match y', and a woman y prefers x to at least one of her current partners. Assume that if a woman is being proposed to by a man whom she prefers to both of her partners, then she will randomly choose one of her current partners with whom she will become un-matched.

ii.) Allow the women to propose. Run the algorithm two full executions, while removing the n men assigned after the first run from the list set of males in between executions.

Correct!

- (●) None of these
- ( ) i. only
- ( ) ii. only
- ( ) i. and ii.

Question 6

1 / 1 pts

Regarding the standard version of the propose and reject algorithm given n men and n women, which of the following statements are true. Select all that apply.

- [ ] Each woman is matched with her last choice.
- [ ] Each man is matched with his first choice.

Correct!

- [x] Women are matched with their worst possible matches.

Correct!

- [x] Men are matched with their best possible matches.
- [ ] The number of loop iterations must be strictly greater than n.

Question 7

1 / 1 pts

The stable matching problem is rooted in graph theory (as the term matching suggests). Describe an instance of stable matching in terms of a graph problem, where $G = (V, E)$ is the graph.

- ( ) The nodes of the graph represent participants. They form a complete graph, where the edges represent a potential pairing of two participants. The preference lists are encoded in a utility function that maps matchings of G to real utility values.
- ( ) The edges of the graph represent participants. Any edge will be incident to two nodes, that each represent a possible pairing of the representative participant and some other participant. The preference lists are encoded in a utility function that maps matchings of G to real utility values.

Correct!

- (•) The nodes of the graph represent participants. They form a complete bipartite graph, where the edges represent a potential pairing of two participants. The preference lists are encoded in a utility function that maps matchings of G to real utility values.
- ( ) The edges of the graph represent participants. Any edge will be incident to two nodes, that each represent a possible pairing of the representative participant and some other participant. The preference lists are encoded in the nodes themselves.

Quiz Score: 7 out of 7