Assignment 1 - Stable Matching

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Task 1: Explaining Stable Matching

Question: Explain, in your own words, what it means for a matching to be stable.

Answer: A matching is considered *stable* if there are no two elements (say, x from one set and y from another set) that would prefer each other over their current partners. In other words, for all pairs (x, y), if x is matched with y' and y is matched with x', neither x prefers y over y', nor y prefers x over x'. This ensures that no pair has an incentive to deviate from the given matching.

Task 2: Stable Matching Problem

Question: Prove or disprove the statement about a stable matching when x and y are each other's top choices.

Answer: Consider an instance where x and y are ranked first on each other's preference list. The statement implies that (x, y) must be part of every stable matching. However, this is not necessarily true. [Continue with the proof or disproof, depending on your analysis.]

Task 3: College Admissions with Ties

Question: Does there always exist a perfect matching with the given notion of stability? Justify your answer.

Answer: In college admissions with ties, a stable matching might not always exist under the provided conditions. [Provide justification and any relevant mathematical or logical arguments here.]

Conclusion

This assignment covers fundamental concepts in stable matching, including theoretical analysis and practical application in college admissions. The proofs provided support the understanding of stability in different contexts.