1. The fatal flaw with this algorithm is that the result will not be a perfect matching. There may be some advisors with no students after three rounds. The key difference between this algorithm and Gale Shapley algorithm is how the advisors give offers to students. In this algorithm, advisors always make at most three offers. In the Gale Shapley algorithm, one advisor would give an offer to a student, and is not limited with how many offers they can give.
2. To fix this fatal flaw, I will change the algorithm so there are multiple rounds of offers until all advisors get a student.
3. Proof by contradiction. Assume that using both GPA and unique location distances to decide the advisor’s preference does not give a total ordering. This means that student a and student b are tied. If they are tied, they have the same GPA and same location distance, but this contradicts our statement that each student has a unique location distance, therefore using both GPA and unique location distances to decide the advisor’s preference list still gives total ordering.
4. In the Gale-Shapley algorithm, the person who is proposing gets a better matching than if they were the one being proposed to. In our case, we can have the students “propose”, This way, they get the best possible outcome for themselves and should have no incentive to lie.
5. Each advisor makes a preference list, ranking students higher if they have a higher GPA. If there are ties, then the advisors break the tie by choosing the student closer to them. The students also make preference lists. Initially, all advisors and students are free. There is a list of advisors who are free. While the list of advisors who are free is not empty, we pick the first advisor and pick a student who is highest on their preference list that they haven’t proposed to yet. If that student is free, then the student takes the advisor’s offer and the advisor is no longer free. Else, if the current advisor the student is matched to is higher on their preference list, the new advisor stays free. Otherwise, if the current advisor the student is matched to is lower on their preference list, then the student takes the offer from the new advisor and the old advisor is free. If there are no free advisors left, then return the list of student-advisor matchings.
6. Copy from powerpoint of GS and adjust
7. Asdf
8. Using the brute force algorithm to get all the permutations of matchings takes O(n!). For each permutation, verifying whether they form a weakly stable marriage takes O(n^2). So the overall runtime complexity of the brute force algorithm with verification of stable marriage is O(n^2\*n!).
9. asdf