COMPSCI 260 – Problem Set 2, Problem 4
Due: Fri 9 Feb 2024, 5pm

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Statement of collaboration and resources used (put None if you worked entirely without collaboration or resources; otherwise cite carefully): None

My solutions and comments for this problem are below.
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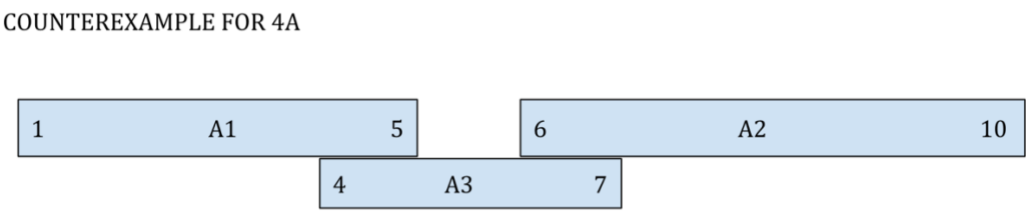
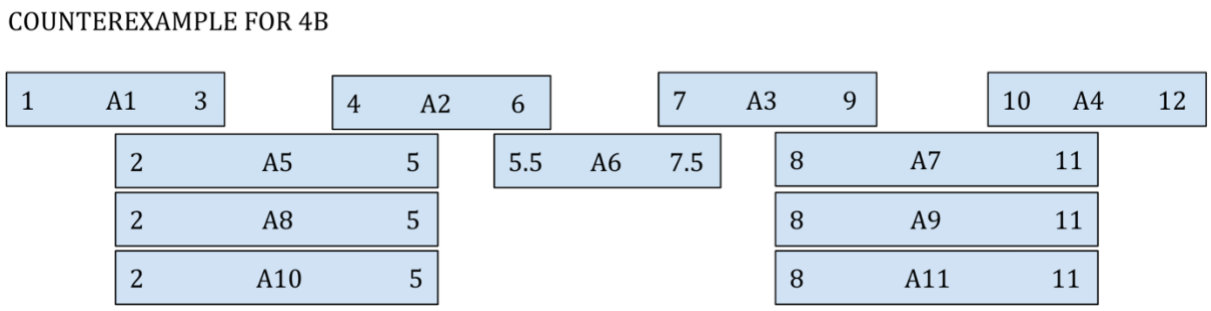
a)



Using the heuristic of selecting the activity of the shortest duration from those that are compatible with the ones already selected does not always work as shown in the counterexample. In this case, A3 will be chosen first because it has the shortest duration, and after it is chosen, A1 and A2 are both incompatible with the previously selected activities, so the algorithm ends with just A3. Looking at the possible activities, it is clear that choosing A1 and A2 is optimal because 2 activities is greater than 1.

b)



The optimal selection in this example is {A1, A2, A3, A4}, as it is the only compatible combination of activities that gives 4 selected activities. The simple case of this would be with only activities 1-7, but I manipulated them in a way to make the heuristic of selecting the activity that overlaps the fewest remaining activities result in a suboptimal solution by adding overlaps to the first and fourth activities, which would otherwise be chosen first. After adding A8-A11, we see that A1 and A4 overlap with 3 activities, and all the rest except A6 overlap with 4. A6 overlaps with 2, so it is chosen first. This causes A2 and A3 to be

omitted from the next selection, and the algorithm chooses one from A1, A5, A8, and A10, and one from A4, A7, A9, and A11 next (we cannot predict which one because they are all tied with 3 overlaps). However, regardless of which specific activity from the 2 sets are chosen, the total number of activities from this heuristic is 3, which is less than optimal.