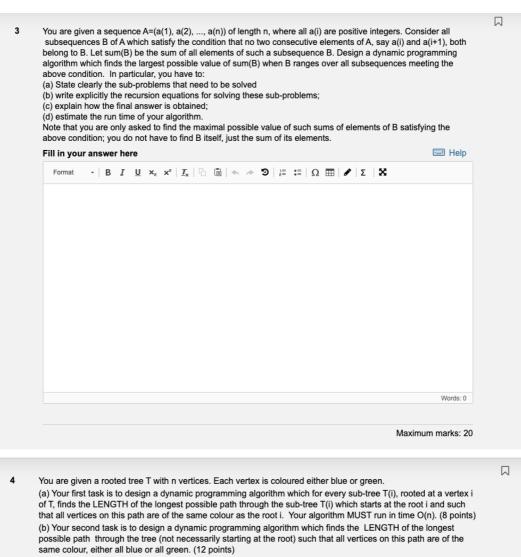


Maximum marks: 20

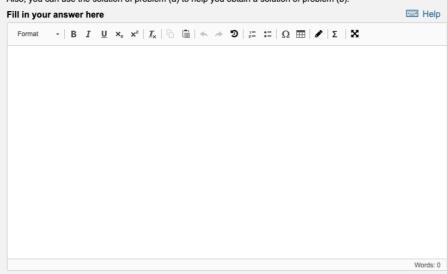


In particular, for both problems separately, you have to:

- (a) state clearly what the sub-problems are that need to be solved;
- (b) describe precisely the recursion for solving these sub-problems;
- (c) explain how the final answer is obtained;
- (d) estimate the run time of your algorithm.

Note that you are only asked to find the length of such a path and not the path itself.

Also, you can use the solution of problem (a) to help you obtain a solution of problem (b).



- Use a max flow algorithm to solve the following problem. Elbonia is grappling with a COVID outbreak. It has N affected cities 1,...,N. City i has p(i) many patients who require an intensive care bed. Hospitals in a city i have b(i) many available intensive care beds in total. Transportation of patients living in a city i to a hospital in a city j where they will be treated is possible only if the city j is within K kilometers (by road) from city i. You are given the above numbers and a map of Elbonia with road distances and have to design an algorithm which assigns each patient from every city i to a sufficiently close city j which has a hospital where that patient can be treated. Your algorithm should make sure that no city i has to accommodate more patients than its total intensive care unit capacity b(i). It should also output a message "impossible" if there is no such assignment. In particular:
  - (a) describe what the vertices of the flow graph are;
  - (b) describe what the edges of the flow graph are;
  - (c) describe how the capacities of all edges are assigned;
  - (d) after applying a max flow algorithm describe how the patients are assigned to cities where they will be treated;
  - (e) describe how it is determined that the problem has no solution meeting the constraints given.

Note: p(i) can be larger or smaller or equal to b(i); also a patient from a city c(i) does NOT have to be treated in a hospital in the same city.

Fill in your answer here

Help

Format - | R T | I V - 2 | T | R (2 4 4 5) | 1 = - 1 | R | A | T | R