
Answer all questions.

1. Assume that you have a graph, with distances between pairs of vertices stored in a matrix. PART 1: Give an efficient algorithm to find the (shortest path) distance between a vertex \( v_i \), and every other vertex \( v_j \). PART 2: Give an efficient algorithm to find the (shortest path) distance between every pair of vertices.

2. A set of \( n \) independent programs must be executed by deadline \( D \), where \( D \) is a positive integer. Two identical processors are available. The durations \( d_i \) of the execution of each program \( i \) on each of the processors is given. You need to assign the \( n \) programs to the two processors so that all the programs will be executed by the deadline \( D \).

Describe your solution; does it solve the problem for all instances? Is the problem in \( P \)? Is it in \( NP \)? Is it \( NP \)-complete?