

**Masters Exam, 1998 version, Algorithms: Spring 2002**

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?