Assignment 15

C-13.2 Show that every language L in P is polynomial-time reducible to the language M={5}, that is, the language that simply asks if the binary encoding of the input is equal to 5.

Algorithm reduceL2M(L)

        S 🡨 solve(L)

        if S = yes then

              return 5

        else

              return 6

A. Show that the MST decision problem is polynomial-time reducible to the Subset Sum problem.

Algorithm reduceMST2SubsetSum(G, K)

         T 🡨 MST(G) //O(mlogn)

         sum 🡨 0

         for each e in T.elements() do

                sum 🡨 sum + weight(e)

         R 🡨 new Sequence

         R.insertLast(2)

         if sum <= K then

               return (R, 1, 2)

         else

               return (R, 1, 1)

B. Show the shortest path decision problem is polynomial-time reducible to the MST decision problem. Hint: convert the shortest path problem to a decision problem, then reduce to MST problem.

Algorithm reduceShortestPath2MST(G, u, v)

     GD <- DijkstraDistances(G, u)

     K 🡨 GD.getDistance(v)

     return (G, K)