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.

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| Algorithm reduceL2M(L) :  S = solve(L)  if S = yes then  return 5  else  return 7 |  |

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

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| 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.

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| Algorithm reduceShortestPath2MST(G, u, v)       GD := DijkstraDistances(G, u)       K := GD.getDistance(v)       return (G, K) |  |