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CS325-001

Practice 6

1.

(a)

i. True. Because X can reduce to 3SAT, since 3SAT is NP, NP-complete and NP-hard, so X is NP.

ii. Unknown. We cannot sure whether X is a NP-hard because we just knew that X can reduce to 3SAT.

(b)

i. True. Because we already knew that 3SAT is NP-hard, so due to 3SAT can reduce to X , X is NP-hard. and since X can reduce to Y , so Y is NP-hard.

(c)

i. True. Because every NP problem can reduce to a NP-complete problem, X is NP-complete so it is also a NP, so X can reduce to Y , vice versa.

2.

This problem can be seemed as an Independent Set problem.

Let us assume that every ingredient is a vertex in a graph G . If (i, j) is 1 represent that (i, j) has an edge. So this problem becomes IS problem.

We already knew that IS is a NP-hard problem. If this problem can be solved in polynomial time, so every NP problem can be solved in polynomial time, that is $P = NP$.