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CS 252

HW #9

1.

X	Y	$X \text{ or } Y$	$X \text{ or } !Y$	$!X \text{ or } Y$	$!X \text{ or } !Y$
F	F	F	T	T	T
F	T	T	F	T	T
T	F	T	T	F	T
T	T	T	T	T	F

$(X \text{ or } Y) \text{ and } (X \text{ or } !Y)$ [1]	$(!X \text{ or } Y) \text{ and } (!X \text{ or } !Y)$ [2]
F	T
F	T
T	F
T	F

[1] and [2]
F
F
F
F

For any X and Y combination, the result is always false. This is not satisfiable.

2. To prove G and H are isomorphic, we need a function that maps the vertices of G to the vertices of H while maintaining all the edges and respective degrees for each vertex. They need the same number of nodes, degree numbers, and those degree numbers have to match. You would need to check every possible remapping case, which would take $O(n!)$ time. That is why $ISO \in NP$.

3. LPATH can be reduced from UHAMPATH.
Checking each combination of routes touching every vertices after starting at s and end at t is $O(n!)$. This is an NP-complete problem