Weekly Challenge 01: Discrete Maths Refresher

CS 212 Nature of Computation
Habib University
Name: Taha Hunaid Ali
ID: ta08451

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1. It's Hero time!

Professor Paradox has been taken captive by Eon. In order to save him, you need to find his Chrononavigator which he hid somewhere. Lucky for you, he left clues behind to find the Chrononavigator. By using the following clues deduce where the Chrononavigator is hidden.

- If Mr.Smoothy is next to a Burger Shack, then the Chrononavigator is in the Plumber's headquarters.

- If Mr.Smoothy is not next to a Burger Shack or the Chrononavigator is buried under Baumann's Store, then the tree in the front of Billion Tower is an elm and the tree in the back of Billion Tower is not an oak.

- If the Chrononavigator is in the Argistix Security office, then the tree in the back of Billion Tower is not an oak.

- If the Chrononavigator is not buried under Baumann's Store, then the tree in front of Billion Tower is not an elm.

- The Chrononavigator is not in the Plumber's headquarters.

2. Over 9000!!

For a set X, $\mathcal{P}(X)$ denotes the powerset of X. Show that $\mathcal{P}(A) \subseteq \mathcal{P}(B)$ if and only if $A \subseteq B$.

3. Skibidi coloring

Let $G = (V, E)$ be a graph where V is the set of vertices and E is the set of edges, then coloring the graph G is defined as assigning a color to each vertex of G such that if two vertices are adjacent then they are assigned a different color than each other. If a graph can be colored with k colors we say it is k-colorable.

Prove that a graph is bipartite if and only if its 2-colorable.