To prove this, we need to show an NP-hard problem is P. We choose . If a unary language is NP-complete, then there exists a polynomial time reduction from to this unary language, and that the problem is satisfiable if and only if the answer to the unary language problem is a certain answer. Polynomial time reduction means if the problem is in length, then the reduction took time, where means “polynomial in n”. This also means the unary reduction of the formula is at most in length.

We use downward self-reduction to help us solve this problem. A formula represented by the possible assignments of its free variables is satisfiable if and only if one of or is satisfiable. Each of those can continue the logic to create a recursive tree of depth and branching factor .