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24 November 2023

Advanced Algorithms

6.2

**1. Give an inductive proof showing that n-SAT is NP-complete for all n>2. (2-SAT is polynomial.)**

Base Case:

N=3

Inductive:

N=k , n = k+1

We know that 3-SAT is NP-complete and using a reduction when k > (n = 3) we can find the comparison that Kamount – SAT is NP complete as well. We can just add (k-n) amount of literals to the base 3-SAT. We then know that 3-SAT can be reduced to Kamount-SAT meaning Kamount-SAT is NP-complete. For K+1 we can just add (k+1-n) literals to 3-SAT that just add clauses at the end. We can then reduce K+1amount-SAT to 3-SAT showing that K+1amount-SAT is NP-complete.

**2. Using the SAT to 3-SAT transformation, give the clauses that would be generated from the following Boolean expression.**

**(a’+b’)(c’+b’+d)(a’)(c’+d+e+f)(a+b+c+d+e’+f)**

**(a’+b’) = (a’+b’+x1)(a’+b’+x1’)**

**(c’+b’+d) = (c’+b’+d)**

**(a’) = (a’ + x2 + x3) (a’ + x2’ +x3) (a‘+x2+x3’) (a’ + x2’+x3’)**

**(c’+d+e+f) = ( c’ + d + x4) (x4’ + e + f)**

**(a+b+c+d+e’+f) = (a +b +x5) (x5’ + c +x6) (x6’ + d + x7) (x7’ + e’ +f)**