If a 3CNF is unsatisfiable, then that means every single one of its assignments makes the 3CNF false. If an assignment is satisfying, that means all of its clauses are true. The probability of a clause being false under an assignment is , as all three literals have to be false, so the probability of a clause being true under an assignment is The probability that a 3CNF is satisfiable under an assignment is thus

To get the expectation of , we do

Where is the probability that there are exactly satisfying assignments for the formula. This is equal to

Because when assignments are satisfying, the remaining assignments are not. This is upper bounded by

Which approaches as approaches infinity. We use Markov’s inequality: where is the number of satisfying assignments. . There exists a that satisfies when . QED.