If a 3CNF is unsatisfiable, then that means every single one of its assignments makes the 3CNF false. If an assignment makes the 3CNF false, that means 1 or 2 or 3 or … or of its clauses are false. The probability of a clause being false is , as all three literals have to be false. The probability of exactly one clause in the 3CNF being false under an assignment is, because the probability of a clause being true is , and any one of the clauses can be false, and all the remaining clauses have to be true. The probability of two clauses being false under an assignment is, and so on. Thus, the probability of an assignment making the formula false is

Which is a binomial expansion.

Since

Then

This is the probability that a 3CNF is unsatisfiable under a particular assignment. The probability that a 3CNF *is* satisfiable under the same assignment is 1 minus that, meaning

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.