Cpt S 515 Homework #6

No late homework!

1. Google uses a Markov chain to mimic a person browsing webpages. Actyually, markov chains have many other applications as well. However, a difficult part is, at first place, a markov chain is hard to obtain for a practical application. Suppose that I treat a coffee maker as a markov chain (to simulate how one would use the machine). Notice that a modern coffee maker is quite complex and full of buttons to control almost everything. Suppose now that I think the coffee maker as a progam and I want to test it. Can you give me a "random" test sequence (of buttons)? This i a difficult program. Open your mind.

2. Show that the following problem is NP-complete:
Given: a Boolean formula F
Question: Does F have even number of satisfying assignments?

3. Show that #3SAT is #P-complete.

4. (easy) Consider a 3SAT Boolean formula F which has variables $x_1, \cdots, x_n$. Recall that the F is a conjunction of clauses, and each clause is a disjunctions of three literals. A Boolean variable a shows up in a clause if either a or $\bar{a}$ is in the clause. A set C of variables is a *cover* of F if for each clause in F, there is a variable in C that shows up in the clause. Let k be the size of a cover C of a given F. Prove that the problem of 3SAT is fixed parameter tractable wrt k.