Prove that this would imply that $P = NP$.

(b) Now suppose we change the check made by the verifier in (a)-ii. to checking the two queried bits are equal (instead of being unequal). Which languages can have such a PCP?

2. (a) For a simple, loopless, undirected graph $G = (V, E)$, define its “square” $G^2$ as follows. The vertices of $G^2$ consist of ordered pairs of vertices of $G$, i.e., the vertex set is $V \times V$. Two pairs $(u_1, u_2)$ and $(v_1, v_2)$ are adjacent in $G^2$ if and only if

$$(u_1, v_1) \in E \text{ or } (u_2, v_2) \in E.$$  

Prove the following statement: For every (simple, loopless) undirected graph $G$, the size of the largest independent in $G^2$ is equal to the square of the size of the largest independent set in $G$. 

(b) Suppose that there is a polynomial time algorithm \( A_{0.01} \) that on any input graph \( G \), finds an independent set of size at least 1% of the largest independent set in \( G \). Show how one can use \( A_{0.01} \) as a subroutine and design a polynomial time algorithm \( A_{0.99} \) that finds an independent set of size at least 99% of the largest independent set in any input graph.

**Hint:** Use the previous part.