Name: Sk. Sabit Bin Mosaddek

Student ID: 1201805106

Q-1

(1) (c)

(2) (e)

(3) (d)

(4) (a)

(5) (e)

Q-2

(a) Yes, i agree with this statement.

We can easily verify that if an assignment of boolean value can result in false. As a tautology is always true, providing one false solution will make the formula invalid. Thus Tautology problem is in co-NP.

(b) My finding is important as it establishes that $P \neq NP$. We know that P is a subset of NP and if we can find at least one problem that belongs to NP but not in P then we can say that NP is not a subset of P. It also establishes that all NP-complete and NP-hard problems can not be solved in polynomial time. Otherwise the problem I found which is in NP but not P will have a polynomial solution and that is contradiction.

(c) The given solution is one possible solution for 3-SAT problem. There might be other solutions to this problem and it can happen that some of them are in polynomial time, we just could not discovered it yet. There is a ~~polynomial~~ exponential time solution for 2-SAT problem but that does not mean it's not in P. We have already found a polynomial time solution for 2-SAT which establishes that 2-SAT in P.

Thus, having an exponential time solution does not guarantee that there won't be any polynomial ~~sat~~ solution and so it doesn't proves that $P \neq NP$.