Exam 2

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1) (25 pts.) The argument to prove that the complement of a regular language is also a regular language is:
"Since L is regular, there is Deterministic Finite State Automaton D that recognizes L. But then, the Deterministic Finite State Automaton $\bar{D}$ obtained interchanging accept and non-accept states of D, recognizes $\bar{L}$, the complement of L."

Is the argument valid when Deterministic FSA is replaced with Non-deterministic FSA and no transformation from Non-deterministic to Deterministic FSA is invoked?

2) (25 pts). Let $L = \{< a, b, c, p >$: a,b,c and p are integers $a^p \equiv c(mod p)\}$. Demonstrate that L is in P.

3) (25 pts) Consider the problem $L = \{< T, w >$: T is a Turing Machine and w a fixed string such that T enters each of its states on input w $\}$

4) (25 pts) Consider the problem $L = \{< G, w >$: G is a context free grammar and w a string, such that $w \in L(G)\}$. Is L decidable? Provide a formal answer.