COMPLEXITY: Exercise No. 6
due next week

1. (Test 2000)Is the following problem **NP**-complete?
   Instance: A graph $G = (V, E)$.
   Question: Does G contain a clique of size $|V|/2$ *and* a hamiltonian cycle?

2. Show that INDEPENDENT SET remains **NP**-complete even if the input graph has no clique of size 3. (Test 95)

3. Are the following problems **NP**-complete or polynomial? (prove)

   EXACTLY ONE SAT:
   Instance: A CNF Boolean formula Φ.
   Question: Is there an assignments to the variables of Φ such that in each clause of Φ there is *exactly* one TRUE literal ?

   MONOTONE 3-SAT:
   Instance: A CNF Boolean formula Φ in which each clause is either of the form $(x + y + z)$ or of the form $(\overline{x} + \overline{y} + \overline{z})$.
   Question: Is there an assignment that satisfies Φ ?

   FEEDBACK VERTEX SET:(Test 92)
   Instance: A graph $G = (V, E)$, a positive integer K.
   Question: Is there a set $S \subseteq V$ with $|S| \leq K$ such that every cycle in G contains at least one vertex from S ?

   THE RURAL POSTMAN PROBLEM: (Test 92)
   Instance: A graph $G = (V, E)$, length $l(e) \geq 0$ for each $e \in E$, a set $R \subseteq E$ and a positive integer K.
   Question: Is there a (non simple) cycle traversing each arc in R at least once with total length $\leq K$?