1) Which of the following languages are decidable?
   - $L_1 = \{ <M> \mid L(M) = \Sigma^* \}$
   - $L_2 = \{ <M> \mid L(M) \subseteq \Sigma^* \}$
   - $L_3 = \{ <M> \mid M \text{ accepts exactly } 20 \text{ inputs} \}$
   - $L_4 = \{ <M> \mid M \text{ has exactly } 20 \text{ states} \}$

2) Which of the following languages are decidable?
   - $L_1 = \{ <M> \mid L(M) \text{ is NP-complete} \}$
   - $L_2 = \{ <M> \mid L(M) \text{ is decidable} \}$
   - $L_3 = \{ <M> \mid L(M) \text{ is either in NP or in co-NP} \}$
   - $L_4 = \{ <M> \mid L(M) \text{ is either undecidable or co-Turing recognizable} \}$

3) Assuming $P \neq NP$, which of the following statements are true?
   - There is no language in NP which has a deterministic polynomial time algorithm
   - There is no language in P which has a non-deterministic polynomial time algorithm
   - NP is not a subset of P
   - P is not a subset of NP

4) Which of the following statements are true?
   - Every decidable language is either in P or in NP.
   - Every language in NP is decidable.
   - Every NP-hard language is decidable.
   - Every NP-hard language is either undecidable or NP-complete
5) Which of the following statements are true?

- If SAT ≤_p \overline{SAT}, then NP = co-NP

- If NP = co-NP then SAT ≤_p \overline{SAT}

- P ⊆ NP ∩ co-NP

- NP ∩ co-NP ⊆ P

6) Let L be an NP-complete language. Which of the following is true?

- SAT ≤_p L

- L ≤_p SAT

- L can be reduced in polynomial time to every language in NP.

- Every language in NP can be reduced in polynomial time to L

7) Consider the following language:

L = \{ <m,n> | m and n are integers such that, 1 < m < n, and n has a factor d with 1 < d ≤ m \}

Which of the following is true?

- L is in NP but not in co-NP

- L is in co-NP but not in NP

- L is in both NP and co-NP

- L is neither in NP nor in co-NP
6) Let $L_1$ and $L_2$ be in NP. Which of the following statements are not necessarily true?

- $L_1 \cup L_2$ is in NP.
- $L_1 \cap L_2$ is in co-NP.
- $L_1^c$ is in NP.
- $L_1^*$ is in NP.

9) Which of the following statements represent the currently known relation between the following classes: P, NP, co-NP and TR (class of all Turing-recognizable languages)?

- $P \subseteq \text{co-NP} \cap \text{NP} \subseteq \text{TR}$
- $P \subseteq \text{co-NP} \cap \text{NP} \subseteq \text{TR}$
- $P \subseteq \text{co-NP} \cap \text{NP} \subseteq \text{TR}$
- $P \subseteq \text{co-NP} \cap \text{NP} \subseteq \text{TR}$