Answer **ANY TWO** of the following three questions:

1. Prove that the language $\{0^n1^n: n \geq 0\}$ over $\Sigma = \{0,1\}$ is **not** regular.

2. Show that the following context-free grammar is ambiguous:

$$S \rightarrow S0S$$
$$S \rightarrow S1S$$
$$S \rightarrow A$$
$$A \rightarrow 0$$

3. Answer each of the following questions with **YES** or **NO** to indicate whether the ***conclusion is always true.*** If you do not know the answer, *do not guess*.
   Scoring: +2 points for correct answers; 0 points for no answers; -1 point for wrong answers

   a. If $A \leq B$ and B is not decidable, ***then A is not decidable.***

   b. If $A \leq_p B$ and A is NP-Complete, ***then B is NP-hard.***

   c. If $A \leq B$ and B is co-acceptable, ***then A is acceptable.***

   d. If $A \leq_p B$ and A is NP-Complete, ***then B is decidable.***

   e. If $A \leq B$ and B is NP-Complete, ***then A is NP-Complete.***

   f. If $A \leq_p B$ and B is in NP, ***then A is co-acceptable***.

   g. If $A \leq B$ and B is decidable, ***then A is decidable.***

   h. If $A \leq_p B$ and B is NP-Complete, ***then A is in NP.***

   i. If $A \leq B$ and B is in P, ***then A is acceptable.***

   j. If $A \leq_p B$ and B is in NP, ***then A is in NP.***