1. Let $\mathcal{X}$, the set of examples, be the set of natural numbers. The hypotheses space $H$ consists of all intervals of the form $[a, b]$ with $a \leq b$. The concept that must be learned is an interval $[c, d]$, where all examples reside.

   (a) Let $h_1, h_2$ be two hypotheses. What does it mean in this context that $h_1$ is more specific than $h_2$?

   (b) Design an algorithm that learns the target concept.

2. Let $\mathcal{X}$ be a set of examples. Suppose that the hypotheses space consists of all functions $h : \mathcal{X} \rightarrow \{t, \infty\}$. Prove that any unobserved example satisfies exactly half of hypotheses in the current version space, regardless of which training examples had been observed.

3. Consider a learning problem where each instance is described by a conjunction of $n$ Boolean attributes $A_1, \ldots, A_n$. Here, a Boolean attribute is an attribute whose domain consists of two values, $t$ and $f$. Thus, a typical instance would be

   $$(A_1 = t) \land (A_2 = f) \land \cdots \land (A_n = t).$$

   Consider a hypothesis space $H$ in which each hypothesis is a disjunction of constraints over these attributes. For example, a typical hypothesis would be

   $$(A_1 = t) \lor (A_5 = f) \lor (A_7 = t).$$

   Design an algorithm that accepts a series of training examples and outputs a consistent hypothesis if one exists. Your algorithm should run in time that is polynomial in $n$ (the number of attributes) and in $m$, the number of training examples.