1. Identify which machine accepts the language defined by each regular expression.

   (a) $a^* + b^*$
   (b) $\lambda$
   (c) $a^*$
   (d) $\emptyset$
   (e) $a(aa + b)^*$
   (f) $a^*b^*$
   (g) $(a + b)^*$
   (h) $(ab)^*$

2. True or False.

   (a) ________ If $L$ is any language, $L + L = L$
   (b) ________ If $L$ is any language, $L \cap L = L$
   (c) ________ If $L$ is any language, $\{\lambda\} \in L^*$.
3. Let $L_1 = \{a, ab\}$ and $L_2 = \{a, ba\}$. How many strings are there in the language $L_1L_2$?

4. True or False. These are harder.
   
   (a) ______ Any language consisting of all decimal numerals of an arithmetic sequence (for example: $\{5, 13, 21, 29, \ldots\}$) is regular.

   (b) ______ Let $L$ be a regular binary language. Let $L'$ be the language of all strings obtained from members of $L$ by substituting $ab$ for 0 and $c$ for 1. Then $L'$ must be regular. For example, if $L = \{0, 10, 10011\}$ then $L' = \{ab, cab, cababcc\}$.

5. Any NFA with $n$ states is equivalent to some DFA with at most $2^n$ states, counting the dead state.

   Draw a DFA equivalent to the following three state NFA.

   ![Diagram of NFA and DFA](image-url)