1. For each of the ten following words, decide which of the 6 machines below accept the given word: $\lambda$, $a$, $b$, $aa$, $ab$, $aba$, $bab$, $baab$, $abb$, $bbb$

(a) ![Diagram](image-a)

(b) ![Diagram](image-b)

(c) ![Diagram](image-c)

(d) ![Diagram](image-d)

(e) ![Diagram](image-e)

(f) ![Diagram](image-f)

2. Build a TG that accepts the language $L_1$ of all words that begin and end with the same double letter, either of the form $aa \ldots aa$ or $bb \ldots bb$.
   
   Note: $aaa$ and $bbb$ are not words in this language

3. Prove that for every TG there is another TG that accepts the same language but only has one final/accepting state.

4. Given a TG, called $TG_1$, that accepts the language $L_1$ and a TG, called $TG_2$, that accepts the language $L_2$, show how to build a new TG (called $TG_3$) that accepts exactly the language $L_1 + L_2$.

5. A student walks into a classroom and sees on the blackboard a diagram of a TG with two states that accepts only the word $\lambda$. The student reverses the direction of exactly one edge, leaving all other edges, labels, initial states, and final states the same. But now the new TG accepts the language $a^*$. What was the original machine?