1. (20 points) Recall that any language, $L$, falls into one of four categories:

   (a) $L$ is recursive
   (b) $L$ is r.e. but not recursive
   (c) $\overline{L}$ is r.e. but not recursive
   (d) Neither $L$ nor $\overline{L}$ are r.e.

   Note that proofs for categories 2, 3 or 4 will typically have two parts — one concerning $L$ and the other $\overline{L}$.

   Classify the following language and give a proof:

   $$L = \{ \langle M \rangle : L(M) = \{\varepsilon\} \}$$

   (Do not confuse $\{\varepsilon\}$ with $\emptyset$.)

2. (10 points) Show the following language is recursive:

   $$L = \{ \langle M \rangle : M \text{ eventually writes a symbol other than blank when started on blank tape.} \}$$