1. What is the number of one-to-one functions \( f \) from the set \( \{1, 2, \ldots, n\} \) to the set \( \{1, 2, \ldots, n\} \) so that \( f(x) = x \) for some \( x \) and \( f(x) \neq x \) for all the other \( x \)?

2. Let \( R \) be the relation defined on the set of real numbers by \( xRy \) whenever \( x^2 + y^2 = 1 \). Show whether or not \( R \) is reflexive, symmetric, antisymmetric or transitive.

3. Let \( R \) be the relation defined on the set of integers by \( xRy \) whenever \( \lfloor x/2 \rfloor = \lfloor y/2 \rfloor \). Prove that \( R \) is an equivalence relation and determine the equivalence classes.

4. Construct a deterministic finite-state automaton for the language \( L = \{w \in \{0, 1\}^* \mid w \text{ does not start with 01 and does not end with 10}\} \).

5. Give an informal description of a deterministic Turing machine for the language \( L = \{ww^Rww^R \mid w \in \{0, 1\}^*\} \).