1. Mark as true or false.
   a. A function is injective if \( f(a) = f(b) \) only if \( a = b \).
   b. A function is injective if \( a = b \) yields \( f(a) = f(b) \).
   c. A function is injective if \( f(a) \neq f(b) \) only if \( a \neq b \).
   d. A function is injective if \( f(a) \neq f(b) \) in case that \( a \neq b \).

2. Let \( A \) be a set and \( P(A) \) be the power set of \( A \). Mark as true or false.
   a. There is an injection from \( A \) to \( P(A) \).
   b. There is a surjection from \( A \) to \( P(A) \).

3. Find a bijection from the set \( \mathbb{N} \) of natural numbers to the set \( \mathbb{E} \) of even natural numbers.

4. Use the Cantor-Bernstein Theorem in order to prove that there is a bijection from the open interval \( (0, 1) \) to the closed interval \( [0, 1] \).

5. Determine whether each of these statements are true or false.
   a) \( \emptyset \in \emptyset \)
   b) \( \emptyset \in \{\emptyset\} \)
   c) \( \emptyset \subseteq \{\emptyset\} \)
   d) \( \{\emptyset\} = \{\emptyset, \emptyset\} \)
   e) \( \{\emptyset\} \subseteq \{\emptyset, \emptyset\} \)
   f) \( \{\emptyset\} \subseteq \{\emptyset\} \)

6. What is the successor of the set \( \{adam, eve\} \)?

7. Determine whether the function \( f: \mathbb{Z} \times \mathbb{Z} \to \mathbb{Z} \) is onto if
   a) \( f(m, n) = m + n \)
   b) \( f(m, n) = m - n \)
   c) \( f(m, n) = m^2 + n^2 \)

8. Let \( f \) be a function from \( A \) to \( B \). Let \( S \) and \( T \) be subsets of \( A \) and \( U \) and \( V \) be subsets of \( B \). True or false:
   a) \( f(S \cup T) = f(S) \cup f(T) \)
   b) \( f(S \cap T) = f(S) \cap f(T) \)
   c) \( f^{-1}(U \cup V) = f^{-1}(U) \cup f^{-1}(V) \)
   d) \( f^{-1}(U \cap V) = f^{-1}(U) \cap f^{-1}(V) \)

9. Assume for sets \( A \) and \( B \) that the power sets are equal, that is \( P(A) = P(B) \). Can you conclude that \( A = B \)?

10. a) Is the empty set \( \emptyset \) the power set of a set?  b) Is \( \{\emptyset, \{a\}, \{b\}, \{a, b\}\} \) the power set of a set?