1. For this problem, let \( N \) be the set of natural numbers (nonnegative integers), let \( E \) be the set of even natural numbers, let \( P \) be the set of primes (integers \( > 1 \) that aren’t divisible by any numbers other than themselves and one), and let \( S \) be the set of integers greater than 1 and less than 10.

   a) List the members of \( S \sim P \).
   b) List the members of \( S \sim (P \cup E) \)
   c) List the members of \( P \cap E \).
   d) List the members of \( (S \sim P) \sim E \).
   e) List the members of \( S \sim (P \sim E) \).

2. For this problem, let \( I \) be \{Mercury, Venus, Earth, Mars\}, and let \( C = \{Spock, McCoy\} \).

   a) List the functions from \( I \) to \( C \), indicating which are one-one and which are onto.
   b) How many functions are there from \( I \) to \( I \). Of these how many are one-one? Onto? Both?

3. Use the method of truth table to identify each of the following sentences as valid, inconsistent, or neither.

   a) \((P \sim (Q \sim R)) \sim ((P \sim Q) \sim \neg R))\)
   b) \(((P \rightarrow Q) \rightarrow R) \sim (Q \rightarrow R))\)
   c) \((P \rightarrow (Q \vee R)) \vee (\neg (P \rightarrow Q) \vee R))\)

4. For each of the following categories, either give an example or explain why there can’t be any example:

   a) A tautological conditional whose antecedent is tautological.
   b) An inconsistent conditional whose antecedent is inconsistent.
   c) A tautological disjunction neither of whose disjuncts are tautological.
   d) A tautological conjunction neither of whose conjuncts are tautological.
   e) An inconsistent sentence with no negation signs.