1. **Set Identities:** Use set identities to show that the following statements are true:

   (i) $\overline{(A - B)} = \overline{A} \cup B$

   (ii) $\overline{\overline{(A \cup B) \cap C} \cup \overline{B}} = B \cap C.$

2. **Propositions:** Determine if the following sentences are propositions. If the sentence is a proposition, determine its truth value.

   (i) There are a finite number of even integers.

   (ii) If x is an integer number, $x + 1$ is odd.

   (iii) $x = x$

   (iv) For all integer values of x, is $2x + 1$ always odd?

3. **Truth Table:** Given the logical expression $\neg(p \wedge q) \oplus [(q \leftrightarrow p) \wedge (\neg q \rightarrow (p \wedge q))]$, construct a truth table to determine whether the expression is a tautology, contradiction or contingency.

4. **Converse, Inverse and Contrapositive:** Find the converse, inverse and contrapositive of the following statement.
   If a car is fuel-efficient, then it is both economical and environmentally friendly.

5. **Propositional Logic:**
   Let p be the proposition "Birds are reptiles.",
   q be the proposition "All rivers flow uphill.",
   r be "Squares have four sides," and
   s be "Not all reptiles lay eggs."
   Express the sentence "If all rivers flow uphill and not all reptiles lay eggs, then birds are reptiles or squares do not have four sides." using compound logic.

6. **Translation of Sentences:** Translate the following English statements using propositional logic

   1. I will not pass this class unless I go to class every day and do all of the homework exercises.

   2. Eating a balanced diet and exercising regularly is necessary for maintaining good health.

   3. Reading books or attending seminars is sufficient for gaining knowledge.

   4. Being a member of the club and having attended at least three meetings is necessary and sufficient for obtaining voting rights.