(1) For each of the following sentences, say whether it is a *statement* or an *open sentence*. Can you state its negation?
   (a) 5 is even or 3 is prime.
   (b) At least one of my two friends misplaced his/her homework assignment.
   (c) For any polyhedron, the number of vertices plus the number of faces equals the number of edges plus 2.
   (d) If $x^4 = 1$, then $x = 1$ or $x = -1$.

(2) Construct a truth table in $P, Q$ for the compound statement $(P \lor Q) \land \neg (P \land Q)$.

(3) Construct a truth table in $P, Q$ for the statement $P \implies Q$. Can you construct a compound statement with the same truth table using only $\neg, \lor, \land$?

(4) Let $A = \{3, 6, 8, 9, 11\}$ and $B = \{6, 9, 10\}$. Find all sets $S$ of integers such that the following statement holds true for all integers $x$.

$$ (x \in S) \implies (x \in A) \land (x \in B) $$

Is there a set $S$ such that $(x \in S) \iff (x \in A) \land (x \in B)$?

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\[ \text{This is sometimes called 'exclusive or', or 'xor'.} \]