1) Let $Q$ be the statement: “In the calendar used in the United States, months have at least 30 days.” Is $Q$ true or false? Explain.

2) Consider the sentence: “All mathematicians are smart.” Write an equivalent sentence (i.e., a sentence that contains exactly the same information) of the form “If $A$, then $B$.“ Identify $A$ and $B$.

3) Prove that the sum of an odd integer and an even integer is odd.

4) Let $a$ be an integer. Prove: $a$ is odd if and only if $a^2$ is odd. (Hint: it may be helpful to use the fact that every integer is either odd or even but not both.)

5) Let $x$, $y$, and $z$ be Boolean variables. Prove that

$$(x \lor y) \rightarrow z$$

is logically equivalent to

$$(x \rightarrow z) \land (y \rightarrow z).$$