1. Make a truth table for the expression $P \implies (P \vee Q)$.

2. Write the following expression (Bertrand's postulate) in English:

$$(\forall n \in \mathbb{N})\,(\exists p \in \mathbb{N})\ \left[(p \text{ is prime}) \wedge (n < p < 2n)\right].$$

3. Is it true that $\left\{x \in \mathbb{R} : x^2 \leq 1\right\} \subseteq \left\{x^2 : x \in \mathbb{R}\right\}$?

4. Find all integer solutions to the equation $x^2 \equiv 1 \pmod 3$.

5. Prove that if 1 is even, then 0.5 is an integer.

6. Let $a, b \in \mathbb{Z}$. Prove that if ab is even, then either a or b is even.

7. Let $a \in \mathbb{N}$. Prove that if $2^a - 1$ is prime, then a is odd or $a = 2$.

8. Is the converse of the statement in problem 7 true?

9. Determine if the following statement is true or false:

$$(\forall a, b \in \mathbb{N})\,(\exists d \in \mathbb{N})\,\left[(d|a \wedge d|b) \wedge ((\forall x \in \mathbb{N})\,(x|a \wedge x|b)\implies x \leq d)\right].$$