For each of the following statements, either prove the statement or give a counterexample that shows the statement is false. **We will use the (non-standard) notation \( \mathbb{I} \) to represent the irrational numbers.**

Each problem is worth 10 points.

1. For all \( m \in \mathbb{N}^2 \), \( m^2 - 1 \) is composite.
2. For all integers \( a \) and \( b \): If \( ab \) is even then \( a \) is even or \( b \) is even.
3. For all integers \( a, b, \) and \( c \): If \( a|c \) and \( b|c \) then \( ab|c \).
4. For all integers \( a, b, \) and \( c \): If \( a|b \) and \( a|c \) then \( a|(b - c) \).
5. For all integers \( a \) and \( b \): If \( a|12b \) then \( a|12 \) or \( a|b \).
6. For all integers \( a, b, \) and \( c \): If \( a|(b + c) \) then \( a|b \) or \( a|c \).
7. For all integers \( m \), if 7 is a factor of \( m \) then 7 is not a factor of \( m + 6 \).
8. \((\forall x \in \mathbf{I}^+)(\sqrt{x} \in \mathbf{I})\)
9. \((\forall x, y \in \mathbb{Q})(\forall z \in \mathbf{I})(\text{If } y \neq 0 \text{ then } x + yz \in \mathbf{I})\)
10. \(\log_5(2) \in \mathbf{I}\). Hint: Consider using the Fundamental Theorem of Arithmetic.