Prove: If a is an even integer and b is an odd integer, then $a + b$ is an odd integer.

Prove that the sum of any two rational numbers is again rational.

Prove: For every positive integer n, $n^2 + 4n + 3$ is not a prime.

Prove that there exists a unique real number x such that $\ln x = 2$.

Prove that if a and b are integers such that a divides b, then a^2 divides b^2.

Let a, b, and c be consecutive integers with $a < b < c$. Prove that if $a \neq -1$ and $a \neq 3$ then $a^2 + b^2 \neq c^2$.

Let n, a, b be integers, where $n > 1$. Prove that if $n = ab$ then either $a \leq \sqrt{n}$ or $b \leq \sqrt{n}$.

Prove by contradiction: If a, b, and c are consecutive integers such that $a < b < c$ then $a^3 + b^3 \neq c^3$.

Let a and b be nonzero integers. Prove that a divides b and b divides a if and only if $a = \pm b$.

Give a proof that $\lim_{x \to 0}(x^2 + 1) \neq 0$.