Name: ________________________________
Nickname: ________________________________

Problem 1.
Prove or disprove

\[(A \setminus B)^c = A^c \cup B\]

Problem 2.
Prove or disprove the inequality:

\[
\frac{3n - 1}{n + 1} \leq \frac{3n + 2}{n + 2}
\]

Problem 3.
Statement: If \(n^3\) is divisible by 3 then \(n\) is divisible by 3.
Prove the statement by the method of contraposition.

Problem 4.
Prove the statement by math induction:
Statement: Let \(p > -1\), then \((1 + p)^n \geq 1 + np\).

Problem 5.
The formal system GEO is defined as follows:
The GEO system uses three types of symbols(objects):

\[\triangle, \Box, \bigcirc\]

The axioms of GEO are:

**Axiom 1.** \(\Box\) is a theorem.

**Axiom 2.** If \(X\) is a theorem then \(X\Box\) and \(X\bigcirc\) are theorems as well.

**Axiom 3.** If \(\Box\Box\) or \(\bigcirc\bigcirc\) is a part of a theorem then they can be replaced by \(\triangle\).
(a) Create a theorem in the formal system GEO.
(b) Which one of two statements below is a theorem in GEO? Explain why one is and the other is not a theorem in GEO! Prove the one which is a theorem.

Statement 1.: ○△□
Statement 2.: △ ○ □