Prove: $\forall x \in S,\ P \Rightarrow Q$.

- Direct: Assume P, show Q
- Contrapositive: Assume $\sim Q$, show $\sim P$.
- Contradiction: Assume $P \wedge \sim Q$, show (given) falsehood
- Induction: Show base: Q for smallest n in P
  - Assume: Q for $n = k$
  - Show: Q for $n = k+1$

Translate Fact about division ⟶ Algebraic Equation

z even	$z = 2k$
z odd	$z = 2m+1$
$a \mid b$	$b = ap$
$z \bmod a = b$	$z = aq + b$
$a \equiv b \pmod c$	$a - b = cq$

→ Example:

$(z^2+1) \equiv 17 \pmod{12}$ ⟶ $z^2 + 1 - 17 = 12m$

Encrypt

- Find sequence a_n
  - for A–Z letters, add a_n to standard number then mod 26, find new letter
  - for binary, add a_n to bit, then mod 2.

Decrypt

- for A–Z, subtract a_n from std. number, mod 26
- for binary, add a_n to bit, mod 2. (OR subtract)

Sets Given $\mathcal{U}$, A, B

- Find: $\bar{A}$, $A - B$, $A \cup B$, $A \cap B$, $\mathcal{P}(A)$, $A \times B$, $A \subseteq B$?
  - → Example:

    Find $\overline{\bar{A} \cup (\overline{B - A})}$ using DeMorgans
- Find $|A|$, $|A \cup B|$, $|A - B|$, $|\mathcal{P}(A)|$, $|A \times B|$
  - → Example:

    Find $|\mathcal{P}(A \cup B) \times (A - B)|$