Pointers for writing or **re**writing induction proofs

- **Remember that P(*n*) is a statement, not a number or a function.**
  When describing statements, do not use an "=" sign.
  P(*n*) is a statement about the particular number *n*, not about all natural numbers at once.

  Good:
  For each natural number *n*, let P(*n*) be the statement "$1 + 2 + 3 + \cdots + n = \frac{n(n+1)}{2}$."
  For every integer $n \geq 7$, let P(*n*) be the statement "$2^n < n!$".

  Bad:
  Let $\mathrm{P}(n) = \frac{n(n+1)}{2}$ for all natural numbers n.
  Let $\mathrm{P}(n) = 1 + 2 + \ \ldots + n = \frac{n(n+1)}{2}$.
  Let P(*n*) be the statement "$2 + 4 + 6 + \cdots + 2n = n(n + 1)$ for every $n \geq 1$".

- **Be precise about your induction hypothesis!** This includes being careful to specify the nature of the *n* being considered.

  Good:
  Assume P(n), where *n* is a natural number.
  Assume P(*n*), where *n* is some integer with *n* ≥ 7.
  Assume P(1), P(2), …, P(*n*) all hold, where *n* is a natural number.
  Assume P(3), P(4), …, P(*n*) all hold, where *n* is some integer with $n \geq 3$.

  Bad:
  Assume P(*n*).
  Assuming P(*n*) says *n* > 3.
  Assume P(1), …, P(*n*).

- **The conclusion of the induction step is P(*n*+1), not P(*n*).**

- **After completing the induction step, end your proof with the correct conclusion.**

  Good:
  By the Axiom of Mathematical Induction, P(*n*) holds for all integers $n \geq 13$.
  By the Axiom of Complete Mathematical Induction, P(*n*) holds for all natural numbers *n*.

  Bad:
  Thus, P(*n*) is true.

- **Write neatly! Many assignments were bordering on illegible this time around.**