Some Big Ideas, Week 6
Feb 23 – Feb 27, 2026

- **General structure of a Proof by Strong Induction:**

  Start by giving the statement that you want to prove:

  Let $P(n)$ be the statement ...

  To prove $P(n)$ is true for all $n \geq a$, requires two steps:

  1. **Base case:** Prove that each of the statements $P(a), P(a+1), \ldots, P(m)$ is true.
     The value of m depends upon the statment.

  2. **Inductive case:** Assume that $P(b)$ is true $\forall b \leq k$, and prove that $P(k+1)$ is true.

  If you successfully proved both results, then you can conclude

  Thus, by the principle of strong mathematical induction, $P(n)$ is true $\forall n \geq a$.

  Compare this to last week's Big Picture Ideas for a proof by induction. What is different?

- Review the Big Picture Ideas from previous weeks.

- Read Appendix A, Elements of Style for Proofs, in Ernst *Introduction to Proof via Inquiry-Based Learning* at `http://danaernst.com/IBL-IntroToProof/`.

  It includes some really good, concrete stylistic advice when writing up your proofs (although I think reasonable people may disagree about their suggestion #9).

Some of the resources I used in constructing the Big Ideas notes this semester are: Ernst: *Introduction to Proof via Inquiry-Based Learning*; Epp: *Discrete Mathematics with Applications, 4th edition*; Levin: *Discrete Mathematics, An Open Introduction, 4th edition*; Sundstrom: *Mathematical Reasoning, Writing and Proof, Version 3*.

Check the **Tentative Weekly Syllabus** on the course webpage for the specific sections relevant for this week.