## Some Big Ideas, Week 6

### Feb 27 – Mar 3, 2023

⊙ **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 $P(a)$ is true.

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).

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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, 3rd edition*; Sundstrom: *Mathematical Reasoning, Writing and Proof, Version 3*; and the notes of my colleague, Rachelle DeCoste at Wheaton.

Check the Tentative Weekly Syllabus for the specific sections relevant for this week.

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