Today's topics

- Induction

- Reading: Sections 3.3
- Upcoming
  - More Induction

§3.3: Mathematical Induction

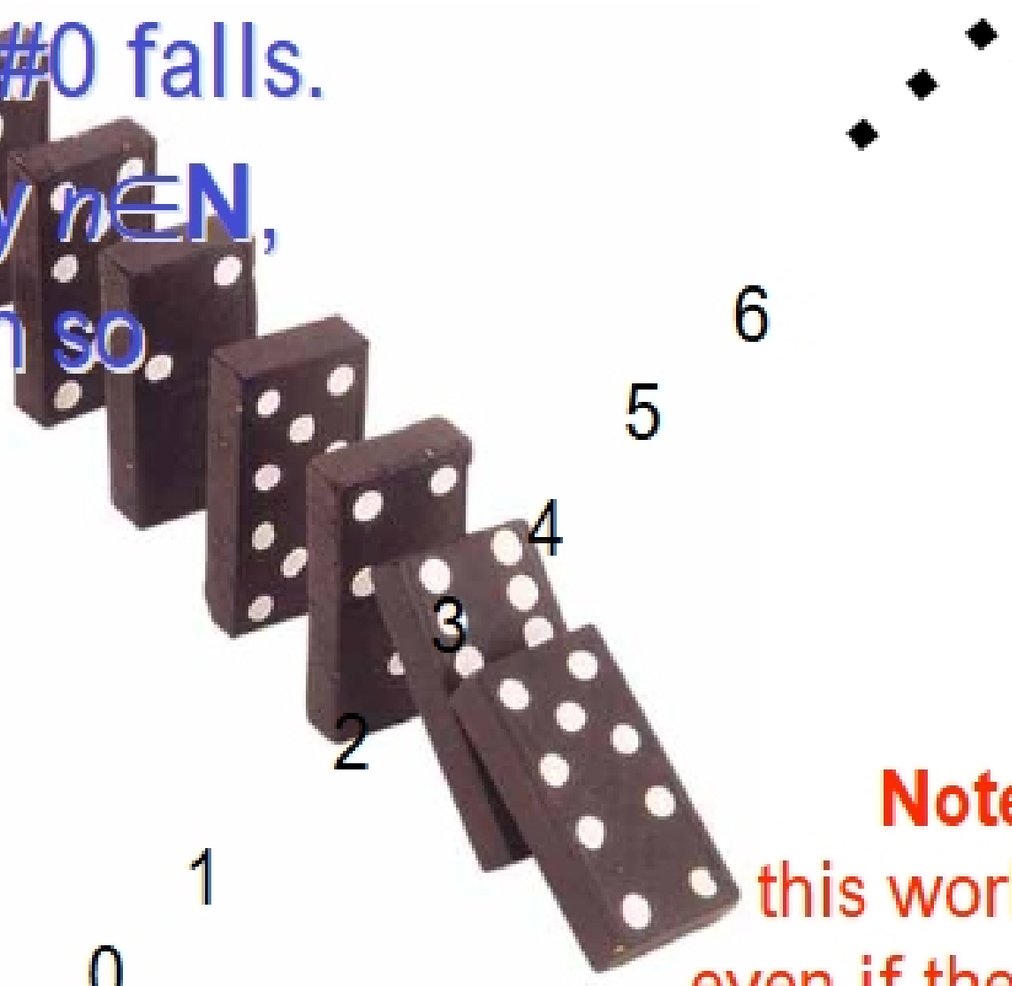
- A powerful, rigorous technique for proving that a predicate $P(n)$ is true for *every* natural number n, no matter how large.
- Essentially a "domino effect" principle.
- Based on a predicate-logic inference rule:

$$\frac{P(0) \quad \forall n \geq 0\ (P(n) \rightarrow P(n+1))}{\therefore \forall n \geq 0\ P(n)}$$

"The First Principle of Mathematical Induction"

The "Domino Effect"

- **Premise #1:** Domino #0 falls.
- **Premise #2:** For every $n \in \mathbf{N}$, if domino #n falls, then so does domino #n+1.
- **Conclusion:** All of the dominoes fall down!



Note: this works even if there are infinitely many dominoes!