Induction, Episode V: The Recursion Fairy Strikes Back

Part b: Picking Base Cases

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Learning Objectives

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- Decide how many base cases to include in an inductive proof.
- Explain why proofs with too few base cases break.

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- **Q**: Can you have too few base cases?
- A: Yes! Watch out for this.

Claim

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Proof.

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Let $k \in \mathbb{N}$ be arbitrary, and suppose n is irrational for

$$n = 0, 1, \ldots, k - 1.$$

We then have k = (k - 1) + 1.

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Hence by induction, every natural number is irrational.

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Let $k \in \mathbb{N}$ be arbitrary, and suppose n is even for $n = 0, 1, \dots, k - 1$.

We then have

$$k = (k-2) + 2$$

= $2m + 2$ (since $k - 2$ is even by the I.H.)
= $2(m+1)$,

so k is even.

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Recap: Learning Objectives

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