

Quiz!

Learning Goals

Write inductive proofs

Announcement: How to do self grade

Parts of Inductive Proof

1. Set-up

2. Base-case :

3. Inductive step/case :

4. Conclusion

What is
purpose
of each?

Parts of Inductive Proof

1. Set-up (state problem, approach) ← Purpose
 2. Base-case: (1st solution) ← Purpose
 3. Inductive step/case: ($k^{\text{th}} \rightarrow (k+1)^{\text{th}}$ solution) ← Purpose
 4. Conclusion (put a bow on it!) ← Purpose
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(Tell them what you're going to say, say it, tell them what you said)

Proof Tips

- Don't try to figure out all steps before starting proof. The process of writing the proof will help you to figure it out.
- Phrase inductive assumption $(P(k))$ using as much math as possible

e.g. Instead of: $7^k - 1$ is divisible by 6,
Better: $7^k - 1 = 6m$ for an integer m

- Use complete sentences (to test try to read aloud. Note equations are sentences.)

Prove: $2^n - 1 \leq 3^n$ for all integers $n \geq 1$.

[See slides for solution.]

Hint: Start $2^k - 1 \leq 3^k$

\Downarrow Transform

$2^{k+1} - 1 \leq \text{some thing}$

\swarrow

Some thing $\leq 3^{k+1}$

} Transitive Property

$\rightarrow 2^{k+1} - 1 \leq 3^{k+1}$

Prove: ReverseString algorithm is correct

For algorithms not always obvious:

- What is "n", the global inductive variable
- What is base case

Solution: See slides