Direct Proof Steps

These are the usual steps. We'll see different outlines in the future!!

- Introduction
  - Declare an arbitrary variable for each ∀ quantifier
  - Assume the left side of the implication
- Core of the proof
  - Unroll the predicate definitions
  - Manipulate towards the goal (using creativity, algebra, etc.)
  - Reroll definitions into the right side of the implication
- Conclude that you have proved the claim

Another Direct Proof

Prove: "The product of two odd integers is odd."

What's the claim in logic?

How would we prove this claim?

Yet Another Direct Proof

Definitions
$\text{Square}(x) \coloneqq \exists k\, (x = k^2)$

Prove: "The product of two square integers is square."

$$\forall n \forall m \left(\left(\text{Square}(n) \wedge \text{Square}(m)\right) \rightarrow \text{Square}(nm) \right)$$

Try it yourselves

Suppose you know $p \rightarrow q$, $\neg s \rightarrow \neg q$,and p.
Give an argument to conclude s.

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Help me adjust my explanation!