

Universal generalisation

Direct Proof

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Quantified statements

$$\forall m \in U, q(m)$$

How do we prove such a quantified statement?

Conditional proof

$$\forall m \in U, q(m)$$

- Write $p(m) := m \in U$
- The quantified statement is essentially saying

$$p(m) \Rightarrow q(m)$$

The principle of conditional proof applies.

Universal generalisation

Principle

If we can prove that $p(x)$ is true, assuming only that $x \in U$, then we can conclude that $\forall x \in U, p(x)$.

Exercise

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Consider again the assertion that if m is odd, then m^2 is odd.

- 1 Rephrase the assertion with explicit quantification.*
- 2 Prove the resulting statement using universal generalisation.*