01204211 Discrete Mathematics
Lecture 2: Quantifiers and proofs

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This lecture covers:

- More on quantifiers
- How to prove a proposition
- Basic proof techniques

Review: Quantifiers

- A *predicate* is a statement with variables, which can be either true or false, after all its variables are specified.
- If we quantify a predicate completely, the quantified expression now has a truth value, and it is called a quantified proposition.
- Two ways to quantify:
  - **Universal quantifier ($\forall$)** states that the quantified proposition is true when the predicate is true for every value of the variable in the specified set.
  - **Existential quantifier ($\exists$)** states that the quantified proposition is true when the predicate is true for at least one value of the variable in the specified set.
- Quantifiers can be nested. E.g.,
  - $\forall x \forall y P(x, y) \equiv \forall x (\forall y (P(x, y)))$
  - $\forall x \exists y P(x, y) \equiv \exists x (\forall y (P(x, y)))$