Discrete Mathematics
Quiz 1 Solutions

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theorem "p ∧ (p → q) → p ∧ (q ∨ r)"
proof — implies intro
  assume 1: "p ∧ (p → q)"
  from 1 have 2: "p" .. — and elim (1)
  from 1 have 3: "p → q" .. — and elim (2)
  from 3 2 have 4: "q" .. — implies elim
  from 4 have 5: "q ∨ r" .. — or intro (1)
  from 2 5 show "p ∧ (q ∨ r)" .. — and intro
qed

theorem "¬ p ∨ ¬ q → ¬ (p ∧ q)"
proof — implies intro
  assume 1: "¬ p ∨ ¬ q"
  show "¬ (p ∧ q)"
  proof — not intro
    assume 2: "p ∧ q"
    from 2 have 3: "p" .. — and elim (1)
    from 2 have 4: "q" .. — and elim (2)
    note 1 — or elim
    moreover { assume 5: "¬ p"
      from 5 3 have "False" .. — not elim
    } moreover { assume 6: "¬ q"
      from 6 4 have "False" .. — not elim
    } ultimately show "False" ..
qeda