Lecture 1 — Welcome & Warm-up Problems

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See math1061[1] for staff, assessment, and the full schedule.

Warm-up problems

These preview topics for later in semester: proof techniques (number theory & methods of proof), induction/recursion, and graph theory.

1. Let p, q, r be consecutive positive integers with $p < q < r$, and let $a = p + r$, $b = pr$, $c = r - p$. Determine which of a, b, c must be even.
2. Four non-zero real numbers a, b, c, d are given, where $b + d \neq 0$. If $\frac{a}{b} + \frac{c}{d} = \frac{a+c}{b+d}$, show that $ac < 0$.
3. True or False: in every group of five people, there are two people who have the same number of friends within the group.
4. **The Tower of Hanoi**: given a tower of 8 discs in decreasing size on one of three pegs, transfer the entire tower to another peg. Rules: move one disc at a time; never place a larger disc on a smaller one. Is there a solution, and what's the fewest number of moves?
5. **The Königsberg Bridge Problem**: does a route exist through the city crossing each bridge exactly once and returning to the start (no turning around on bridges)?

[1] courses/math1061/math1061.pdf

Notes

- Problems 1-3 preview conditional-statements[2] and proof-writing (the lecture slides leave the worked solutions for in-class discussion, not printed).
- Problem 4 (Tower of Hanoi) previews recursion/induction later in semester (Lectures 13-16) — the classic minimum-move count for n discs is $2^n - 1$.
- Problem 5 (Königsberg bridges) previews graph theory (Lectures 33-34) — the classical resolution (Euler) is that no such route exists, because the underlying graph has more than two vertices of odd degree.

See also

- math1061[3] — assessment weights, staff and the full lecture schedule
- 2026-07-30-logical-form-and-equivalence[4] — Lecture 2, where the symbolic logic starts properly
- practice-problems[5] — the semester-wide Applied Class problem set, reproduced in full with solutions (Applied Classes start in Week 2; the logic sections begin at practice-problems[6])

[2] courses/math1061/conditional-statements.pdf
[3] courses/math1061/math1061.pdf
[4] courses/math1061/2026-07-30-logical-form-and-equivalence.pdf
[5] courses/math1061/practice-problems.pdf
[6] courses/math1061/practice-problems.pdf