

SETS AND PROOFS

P'REVIEW' 1

General Information

- The review will be distributed at noon on Monday February 23. It will be collected at the beginning of class on Thursday, February 26.
- The review is meant to assess your understanding of the course material (and only your understanding of the course material). Given that, use of textbooks, notes, handouts, Internet, etc., is strictly prohibited. The only person with whom you may discuss this review is me (the instructor of the course and author of said-review).
- In fitting with the rest of the work for the course, your responses to the review questions should be formal in the following sense: you should write in legible, clear, grammatically correct English sentences. You must use standard mathematical notation, and follow mathematical conventions of proof (such as ending a proof with a square, or "QED", etc).
- If you have a question about this review, you should email me immediately (ktthompson@davidson.edu).

Topics (not all can appear, but any of the following MAY appear)

- **Results you may use without proof (but not without citation):**
 - Any fraction may be written in reduced form
 - Unique prime factorization
 - Every integer belongs to precisely one congruence class modulo n (for fixed n)
 - Any result from class or from a previous homework
- **Definitions/concepts that might be helpful:**
 - Even integer, odd integer.
 - Rational number.
 - Sets, complements, families, unions of sets, intersections of sets
 - Divides, divisor (and the relationship between congruence and division)
 - Basic properties of congruential arithmetic (multiplication/addition properties)
- **Logic/Set Theory:**
 - Statements, negation of statements
 - Translation--writing symbols in English sentences, writing English sentences as symbols.
 - Tautology/contradiction
 - Universal and existential quantifiers (and their negations)
 - Converse, contrapositive and inverse of a statement.
 - DeMorgan's Laws (for sets and statements)
 - Showing statements are logically equivalent via truth tables.
- **Proof Techniques:**
 - Direct proofs (including in a context of sets)
 - Proof by contrapositive
 - Proof by contradiction
 - Proof by cases
 - If and only if proofs--including showing sets are equal

- Basic induction proofs (emphasis on basic--nothing too complicated)
- **Other:**
 - Generation of examples/counterexamples.
 - The talks--we've had discussions of the Pythagorean Theorem, Heron's formula, and Platonic solids.