

1. Definitions

- (a) divisible, $a|b$
- (b) even, odd
- (c) prime, composite
- (d) $a < b$, $a \leq b$

2. Proofs and Counterexamples

- (a) if-then statements
- (b) if and only if
- (c) “prove or disprove” questions
- (d) “disprove” (give a counter-example)

3. Boolean Algebra

- (a) operations
- (b) truth tables
- (c) logical equivalence

4. Lists

- (a) multiplication principle
- (b) counting lists: with and without repetition, n^k , $(n)_k$
- (c) factorials, $n!$
- (d) counting problems involving a combination of these.

5. Sets

- (a) symbols: \in , \exists , \subseteq , \subset , \supseteq , \supset
- (b) Venn diagrams
- (c) cardinality
- (d) inclusion-exclusion principle for two sets: $|A \cup B| = |A| + |B| - |A \cap B|$
- (e) subsets
- (f) power set
- (g) set operations
 - i. union, intersection
 - ii. difference, symmetric difference
 - iii. Cartesian product
- (h) proofs of $A \subseteq B$
- (i) set equality proofs

6. Quantifiers

- (a) exists (there is)
- (b) for all (every)
- (c) compound statements
- (d) negations