

# **Discrete Mathematics (Math 210) Common Topics List**<sup>1</sup>

## **1. Propositions and Connectives:**

- (a) Truth Tables (optional)
- (b) Logical Equivalences
- (c) Tautologies and Contradictions
- (d) Quantifiers (Universal, Existential)

## **2. Sets and Connectives:**

- (a) Power Sets
- (b) Cartesian Products
- (c) Union, Intersection, Symmetric Difference
- (d) Countability
- (e) Cardinality
- (f) DeMorgan's Laws for Propositions and Sets

## **3. Functions**

- (a) Domain, Codomain, Range, Definition as a set of ordered pairs
- (b) Injection, Surjection, Bijection
- (c) Composition
- (d) Inverse
- (e) Image of a Set and Inverse Image of a Set
- (f) Recursion (optional)

## **4. Methods of Proof:**

- (a) Direct
- (b) Contrapositive
- (c) Contradiction
- (d) Cases
- (e) Induction

## **5. Integers**

- (a) Divisibility
- (b) Euclidean Algorithm
- (c) Greatest Common Divisor
- (d) Modular Arithmetic and Equivalence

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<sup>1</sup>This list was approved by the department on 09/20/22.

- (e) Chinese Remainder Theorem (optional)
- (f) Primes and the Fundamental Theorem of Arithmetic

## **6. Elementary Combinatorics**

- (a) Combinations and Permutations of Sets
- (b) Product Rule and Sum Rule
- (c) Binomial Theorem

## **7. Relations**

- (a) Equivalence Relations, Partitions
- (b) Partial Ordering (optional)