

Updated: April 21, 2018

Exam 1: Topics 1 – 4

Exam 2: Topics 5 – 7

Exam 3: Topics 8 – 9

## Definitions

These are definitions that could appear as part of any question.

- Rational/Irrational (page 10)
- Even/Odd (page 15)
- Divides (page 82)
- Congruence (page 92)
- Division Algorithm (page 143)

## 1 Logic

- Logical equivalencies (Theorem 2.8)
- Quantifiers and negations (Theorem 2.16, Example 2.17)

## 2 Direct Proof

- Direct proof of conditional statements (Theorem 3.1)
- Direct proof of biconditional statements (Proposition 3.11)
- Constructive proof of existence (Proposition 3.12)

## 3 Proof by Contraposition

- Proof by contraposition (Theorem 3.7)

## 4 Proof by Contradiction

- Proof by contradiction (Proposition 3.14)

## 5 Proof by Induction

- Proof by induction. (Proposition 4.7)
- Proof by strong induction (aka “the second principle of mathematical induction”) (Proposition 4.9)
- Proof involving recurrence relations (Proposition 4.13)

## 6 Sets

- Prove set equality by “choose-an-element” method (Proposition 5.11)
- Prove set equality by applying set identities (Theorem 5.18, Theorem 5.20, Progress Check 5.21)

## 7 Functions

These problems may involve compositions (Progress Check 6.19) and inverses (Progress Check 6.24)

- Prove a function is surjective. (Example 6.13)
- Prove a function is injective. (Example 6.14)

## 8 Equivalence Relations

- Prove a relation is an equivalence relation. (Section 7.2 Example 3)

## 9 Countable Sets

- Prove a set is countable. (Theorem 9.13)