Exam I
Review Topics

Section	Topics	Exam Prototypes
0.1	Sets & Notations Function (Map) $\phi: A \to B$ Image One-to-one Onto Composition Identify Map Invertible/Inverse Cardinality	Definitions 0.1.4, 0.1.8, 0.1.11, 0.1.19 Problems, Page 6 3*, 4, 7, 9, 10, 13, 15a*, 15b,
0.2	Equivalence Relation Definition Reflexive Symmetric Transitive Partition Definition Theorem 0.2.7	Definitions 0.2.3, 0.2.6 Problems, Page 9 1, 2, 3*, 4, 7, 11 (compare problem 6)
0.3	Least Integer Principle (Well-ordering) Mathematical Induction Weak Strong Division Algorithm Definitions Divisor Common Divisor Greatest Common Divisor (gcd) Theorem 0.3.17 Euclidean Algorithm Fundamental Theorem of Arithmetic Proposition 0.3.22 (2) Euclid's Lemma Definition Least Common Multiple (lcm) Proposition 0.3.29 Congruence mod n Proposition 0.3.31 Addition of congruence classes Multiplication of congruence classes Units mod n - $U(n)$	Definitions 0.3.15, 0.3.21, 0.3.28, 0.3.30 Problems, Page 22 1, 16*, 17, 22, 23*, 24, 25, 27*

Section	Topics	Exam Prototypes
0.4	Complex Numbers Rectangular (Cartesian) Form Real Part, Imaginary Part Addition, Multiplication Geometry of Addition Modulus, Conjugate Proposition 0.4.12 Polar Form Proposition 0.4.15 Geometry of Multiplication DeMoivre's Formula Powers of Complex Numbers Roots of Complex Numbers	Problems, Page 30 3*, 4-8, 10, 14*, 17-19, 24, 26*
0.5	Matrices Notation $M_{n\times m}(R),\ M(n,r)$ Addition, Multiplication Invertible Determinant Classes $GL(n,R),\ SL(n,R)$	Problems, Page 35 4, 5, 6, 7*, 8, 11*, 12*, 15, 19*
1.1	Group Examples $(C,+),(C^*,\cdot),(\{z:\lvert z\rvert=1\},\cdot),$ $(\{z:z^6=1\},\cdot),(Z_n,\oplus),(Z_p^*,\otimes),$ $(M_{n\times m}(R),+),(GL(2,R),\cdot),$ $(SL(2,R),\cdot),(Sym(\Delta),\circ)$ Definition $(G,*)$ Closure * Associative * Identity e (for *) Inverses Abelian Group Table Proposition 1.1.24 (Basic group properties) Order of a group G	Definitions 1.1.7, 1.1.8 Problems, Page 48 1*, 2, 4, 6, 10, 12*, 18, 21

Section	Topics	Exam Prototypes
1.2	Subgroup Examples Definition Subgroup Tests Theorem A Theorem B Theorem C Theorem D Orbit of a, $\langle a \rangle$ (Cyclic subgroup generated by a) Order of a, $\lvert a \rvert$ Center of G, $Z(G)$	Defintions 1.2.4, 1.2.16, 1.2.28 Problems, Page 54 2*, 3, 6, 8*, 9*, 11*, 12*, 14*, 15, 18*, 21*, 22*, 24, 26*, 30*, 36