

Terms  
Mathematics 309a Abstract Algebra  
Winter Semester 2009  
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From: Fraleigh, John B. *A First Course in Abstract Algebra*. 7<sup>th</sup> ed. Addison-Wesley. 2003.

**Section 0**

set  
elements  
empty set  
well defined  
subset of a set  
improper subset  
proper subset  
Cartesian product  
relation between sets  
relation on a set  
function  
mapping  
domain  
codomain  
range  
cardinality  
one-to-one correspondence  
one to one  
onto  
inverse function  
same cardinality  
infinite set  
partition  
cell  
residue classes module  $n$   
equivalence relation  
congruence modulo  $n$   
reflexive  
symmetric  
transitive  
equivalence class  
closed interval  
power set

**Section 1**

complex numbers  
imaginary number

absolute value  
Euler's Formula  
addition modulo  $2\pi$   
 $n^{\text{th}}$  roots of unity

**Section 2**

binary operation  
closed under  $*$   
induced operation  
commutative  
associative  
not everywhere defined  
not well defined  
not closed under  $*$

**Section 3**

binary algebraic structure  
isomorphism of binary algebraic structures  
isomorphic binary structures  
structural property of a binary structure  
identity element for  $*$

**Section 4**

group  
associativity of  $*$   
identity element  $e$  for  $*$   
inverse  $a'$  of  $a$   
abelian  
general linear group of degree  $n$   
left and right cancellation laws  
semigroup  
monoid  
left identity element  
left inverse  
idempotent for  $*$

**Section 5**

order of a group  
subgroup of a group  
improper subgroup of a group  
proper subgroup of a group  
trivial subgroup of a group  
nontrivial subgroup of a group  
Klein 4-group  
cyclic subgroup of a group generated  
by a  
generates  
generator for  
cyclic group  
orthogonal matrices

### **Section 6**

order of an element a  
infinite order  
quotient  
remainder  
greatest common divisor  
relatively prime  
automorphism of a group  
primitive nth roots of unity  
least common multiple

### **Section 7**

generators of a subgroup  
intersection of sets  
subgroup generated by a set  
finitely generated  
digraph  
vertex  
arc

### **Section 8**

permutation of a set  
symmetric group on n letters  
group of symmetries of an  
equilateral triangle  
nth dihedral group  
group of symmetries of the square  
octic group  
image of a set under a function  
left regular representation of a group  
right regular representation of a  
group  
orbit of an element under a

permutation

### **Section 9**

orbits of a permutation  
cycle  
length of a cycle  
disjoint cycles  
transposition  
even permutation  
odd permutation  
alternating group on n letters

### **Section 10**

left coset  
right coset  
index of a subgroup in a group

### **Section 11**

Cartesian product of sets  
direct product of groups  
direct sum of groups  
Betti number  
decomposable  
indecomposable  
torsion subgroup of a group  
torsion free abelian group  
torsion coefficients

### **Section 13**

homomorphism of groups  
trivial homomorphism  
evaluation homomorphism  
linear transformation  
projection map  
reduction modulo n  
kernel of a homomorphism  
normal subgroup of a group

### **Section 14**

factor group  
congruent modulo a subgroup  
quotient group  
automorphism  
inner automorphism  
conjugation  
invariant  
conjugate subgroup

torsion group  
torsion free

### **Section 15**

simple group  
maximal normal subgroup of a group  
center of a group  
commutator  
commutator subgroup

### **Section 18**

ring  
left distributive law  
right distributive law  
multiplication modulo  $n$   
direct product of rings  
homomorphism of rings  
isomorphism of rings  
isomorphic rings  
commutative ring  
ring with unity  
multiplicative inverse  
unit of a ring  
division ring  
skew ring  
field  
subring of a ring  
subfield of a field  
idempotent element of a ring  
nilpotent element of a ring  
Boolean ring

### **Section 19**

divisors of 0  
integral domain  
characteristic of a ring  
characteristic 0

### **Section 20**

Mersenne primes  
Euler phi-function

### **Section 21**

field of quotients of an integral domain  
Gaussian integers

### **Section 22**

indeterminate  
polynomial with coefficients in a ring  
coefficients of a polynomial  
degree of a polynomial  
constant polynomial  
ring of polynomials in  $n$  indeterminates  
zero of a polynomial

### **Section 23**

irreducible polynomial over a field  
reducible polynomial over a field  
cyclotomic polynomial