Assigned: Page 54, Exercise 2, 4, 23, 25, 33

Exercise 2

Which of the following binary operations are associative?

a. subtraction of integers

b. division of nonzero rationals

c. function composition of polynomials with real coefficients

d. multiplication of 2 x 2 matrices with integer entries

e. exponentiation of integers

Exercise 4

Which of the following sets are closed under the given operation?

a. 0, 4, 8, 12 addition mod 16

b. 0, 4, 8, 12 addition mod 15

c. 1, 4, 7, 13 multiplication mod 15

d. 1, 4, 5, 7 multiplication mod 9

Exercise 23

(Law of Exponents for Abelian Groups)
Let a and b be elements of an Abelian group and let n be any integer. Show that $(ab)^n = a^n b^n$.
Is this also true for non-Abelian groups?

Exercise 25

Prove that a group G is Abelian iff $(ab)^{-1} = a^{-1}b^{-1}$, $\forall$ a, b $\in$ G.

Exercise 33

Suppose the table below is a group table. Fill in the blank entries.

	e	a	b	c	d
e	e	-	-	-	-
a	-	b	-	-	e
b	-	c	d	e	-
c	-	d	-	a	b
d	-	-	-	-	-

$\longrightarrow$

	e	a	b	c	d
e	e	-	-	-	-
a	-	b	-	-	e
b	-	c	d	e	-
c	-	d	-	a	b
d	-	-	-	-	-