

# M316 Final Exam Review Sheet

November 26, 2008

## 1. Chapter 1: Foundations for Learning Mathematics

- (a) Getting Comfortable with Mathematics  
The student should be able to identify situations in which we use mathematics in the real world.
- (b) Problem Solving  
The student should know some basic strategies for solving problems, such as writing down what you know, trying easier cases, and so forth. It would be good to understand how pattern recognition helps us solve problems.

## 2. Chapter 2: Fundamental Concepts

- (a) Algebraic Thinking  
The student should be able to explain what the notion of equality really means. It is also important to understand how graphs convey information about the behavior of functions.
- (b) Numeration  
The student should understand, and be able to describe in detail, how our base 10 place-value system works. This includes an understanding of how to identify a number just by looking at the way that it is written, and of how our system differs from other enumerative systems. Another important topic from this section is the generalization of this system to arbitrary bases, including how to convert a number from one base to another.

## 3. Chapter 3: The Four Fundamental Operations of Arithmetic

- (a) **Models of Operations**  
The student should understand the various meanings of the different operations and the real-world phenomena that they capture. This includes the ability to identify the model that fits a given word problem.
- (b) **Properties of Operations**  
The student should understand that subtraction is the inverse operation of addition, and that division is the inverse operation of multiplication. It would be useful to know what is meant by the terms “additive inverse” and “multiplicative inverse”. The student should be able to identify properties of operations such as the commutative and associative properties of addition.
- (c) **Standard Algorithms**  
The student should understand in detail how to perform the four fundamental operations of arithmetic using the standard algorithms. The student should know, in particular, how these algorithms rely on our place-value system, and how they implicitly make use of the commutative, associative, and distributive properties.

#### **4. Chapter 4: Number Theory**

- (a) **Prime Factorization**  
The student should know how to find the prime factorization of a number, and how to use this to find factors and multiples of that number.
- (b) **Greatest Common Factor and Least Common Multiple**  
The student should understand the definitions of the greatest common factor and least common multiple, how to compute them using prime factorizations, and applications of these ideas to real-world situations.

#### **5. Chapter 5: Extending the Number System**

- (a) **Integers**  
The student should be able to identify integers and know the relationship between the integers and the natural numbers. An important topic from this section was that of operations with negative

numbers; the student should be able to perform them and describe scenarios in which they naturally occur.

(b) Rational Numbers

The student should understand the various different meanings of fractions as well as different ways of representing them. This includes the ability to describe why equivalent fractions are in fact equivalent. Furthermore, the student should be able to perform operations with fractions and decimals and explain why those algorithms work. Another important topic is how to compare two abstract rational numbers and determine which one is larger.

(c) Real Numbers

The student should understand that not all numbers are rational and be able to identify important examples of irrational numbers. The student should understand the concept of number as a measurement.

## 6. Chapter 6: Proportional Reasoning

(a) Ratios

The student should be able to identify situations in which it is important to be able to think proportionally. The student should also understand the idea of proportion as a function.

(b) Percents

The student should understand the meaning of percentages and be able to perform calculations with them.