Math 1030 - Fall 2009 Review Sheet for Exam #2

The second exam is on Thursday, November 19 during class time. For this exam, you are responsible for Sections 3.1 - 3.3, 4.2 - 4.3, 5.1 - 5.2, 6.1 - 6.2 of the text, as well as the in-class worksheets we have done. You may bring a non-cellular calculator and something to write with. No notecards or other aids are allowed.
Don't hesitate to ask me questions as they arise. Good luck!

Section 3.1: Addition and Subtraction of Whole Numbers
Definitions: sum, addend, difference, missing addend.
Be able to demonstrate addition or subtraction of two whole numbers with any model we covered in class. Know the four properties of whole number addition: closure, commutativity, associativity, and identity. Be able to use and illustrate these properties in problems. Be able to show that the four properties of whole number addition do not hold in whole number subtraction. Using the techniques of this section, you should know how to perform addition and subtraction of small numbers in bases other than 10.

Section 4.2: Written Algorithms for Whole-Number Operations
Be able to use any algorithm we covered in class to add, subtract base 10 whole numbers. Some are discussed in the book, and others are found in the worksheets.

Section 3.2: Multiplication and Division of Whole Numbers
Definitions: product (pgs. 124-5), factor, partitive division, measurement division, quotient, remainder, divisor, dividend.
Be able to demonstrate multiplication or division of two whole numbers with any of the models covered in class. Know the properties of whole number multiplication listed on pages $125 - 128$ and be able to demonstrate them. Be able to find the quotient and remainder of a division (division algorithm) and how to use it to solve problems.
You should know how to explain why division by zero is undefined and why zero can be divided by any nonzero whole number. Why do the properties of whole number multiplication not work for whole number division?

Section 3.3: Ordering and Exponents
Definitions: exponent, power, base, exponential.
Be aware of the properties of "less than" for whole numbers (pgs 140-141). Although we didn't discuss them in class, you should be familiar with them from previous math classes. What is an exponent? What is a base? How are they used to rewrite products of the same number? Be able to use the theorems and definition about exponents on pages 142-144. The subsection on order of operations will not explicitly be covered on the exam, although you should know order of operations from previous math classes.

Section 4.2: Written Algorithms for Whole-Number Operations
Be able to use any algorithm we covered in class to add, subtract, multiply, and divide base 10 whole numbers. Some are discussed in the book, and others are found in the worksheets.

Section 4.3: Algorithms in Other Bases
Be able to use any algorithm we covered in class to add, subtract, and multiply in any base. Some are discussed in the book, and others are covered in the worksheets. Be aware that the algorithms from base 10 computations can be adapted for use in any base. You may use

any method when multiplying in bases other than 10. (i.e. I will ask you to "compute," not "compute using the ___ model.") You are not responsible for division in bases other than 10.

Section 5.1: Primes, Composites, and Tests for Divisibility
Definitions: "a divides b," factor, divisor, multiple, "divisible by," prime number, composite number, unit, factor tree, prime factorization, prime power representation, $\mathbb{N}$.
Be able to construct a factor tree for a given natural number and use it to write down the prime power representation (prime factorization with powers) of the number. Also know how to use division to determine a number's prime factorization. Be able to represent "b divides a" by using the array model of multiplication. Be able to list the divisors of a number. You should know the statements of the unnamed theorems on pg 208 and 212, but you do not need to know how to prove them. Be able to determine if a number is divisible by 2, 3, 4, 5, 8, 9, or 10. You do not need to know the test for divisibility by 11. Be aware of the Prime Factor Test and how to use it in problems.

Section 5.2: Counting Factors, Greatest Common Factor, and Least Common Multiple
Definitions: GCF, LCM, Euclidean algorithm.
The book discusses (we didn't) the idea of counting factors. You should be comfortable with listing factors of a given number and then counting how many there are. Be aware that any natural number $n \geq 2$ can be uniquely expressed as a product of powers of prime numbers. Know how to compute $\text{GCF}(a, b)$ by using intersection of sets, prime factorizations, and the Euclidean Algorithm. Know how to compute $\text{LCM}(a, b)$ by using intersection of sets and prime factorizations. Be able to use the first Theorem on pg 226.

Section 6.1: The Set of Fractions
Definitions: the set of fractions, fraction, numerator, denominator, equivalent fractions, cross-multiplication, proper fraction, improper fraction, mixed number, simplest form.
What is the set of fractions? How do fractions arise in real-world situations? How do you represent fractions with different models? How can you determine if two fractions are equivalent? How can you determine if one fraction is larger than another? Be able to convert between improper fractions and mixed numbers. What are some of the ways we discussed in class for writing a fraction in simplest form?

Section 6.2: Fractions: Addition and Subtraction
Definitions: least common denominator.
How do you add or subtract two fractions with common denominators? unlike denominators? What are some of the models we have discussed for representing fraction addition and subtraction? Pgs 257-258 list properties of fraction addition. You should know them. Do any of these properties hold true for fraction subtraction? You are not responsible for the subsection on mental math and estimation.

Section 6.3: Fractions: Multiplication and Division
Definitions: multiplicative inverse, reciprocal, complex fraction.
Be able to represent multiplication and division of fractions by using models. How do you multiply or divide two fractions? Pgs 269-270 list properties of fraction multiplication. You should know them. Do any of these properties hold true for fraction division? If you multiply a number by its reciprocal, what is the product? You are not responsible for the subsection on mental math and estimation.