MA 101 Test 2
June 18, 2009

Review your notes, quizzes, and assigned work over the topics below.

WORDS TO KNOW	CONCEPTS TO KNOW	PROCEDURES TO KNOW
addition	what it means for a set of numbers to be closed under an operation	determining what properties hold for a set of numbers
algorithm	what it means for a set of numbers to have associativity under an operation	classifying word problems by operation type
associativity	what it means for a set of numbers to have an identity under an operation	performing arithmetic operations with integers
closure	what it means for each element of a set of numbers to have an inverse under an operation	determining why particular algorithms work
commutativity	what it means for a set of numbers to have one operation to distribute over another	
distributivity	relationships among the sets of natural numbers, whole numbers and integers	
division—repeated subtraction, sharing	why particular algorithms work	
identity		
integers		
inverse		
multiplication—repeated addition, cross product, array		
natural numbers		
negative		
operation		
positive		
subtraction—comparison, take away, missing addend		
whole numbers		

Chapter 3 Expectations:
You will be expected to:

1. Determine if a number is a natural number, whole number, or integer and know the relationship between these sets of numbers.
   See **Activity 3.1** - 2 through 5 and p. 93ff 10, 30
2. Determine if a given set under a specified operation is
   a. closed;
   b. commutative;
   c. associative;
   d. has an element which is an identity;
   e. has an element which is an inverse of another given element.
   See **Activity 3.1** - 6-21 and p.93ff 3, 4, 26, 27, 37

   Note: The operation may be specified many different ways:
   a. as addition, subtraction, multiplication, or division on a specific set.
      See **Activity 3.1** - 6-11 and p.93ff 37
   b. as a table See **Activity 3.2** - 1 and p.93ff 3, 4
   c. as a procedure See **Activity 3.2** - 2 and p.93ff 2

3. Given a mathematical number sentence (equation), identify the correct property used (or if it used correctly).
   See **Activity 3.1** - 1 and p.93ff 38
   Given the property, use numbers to illustrate. See p.93ff 1, 5
4. Identify and use the distributive property of multiplication over addition and the distributive property of multiplication over subtraction. See **Activity 3.1** - 1 and p.93ff – 5

5. Classify word problems as
   a. addition, subtraction, multiplication, or division.
   b. conceptual approaches such as
      i. Comparison Approach (Subtraction)
      ii. Take Away Model (Subtraction)
      iii. Missing Addend Model (Subtraction)
      iv. Repeated Addition Approach (Multiplication)
      v. Rectangular Array Approach (Multiplication)
      vi. Cartesian Product or Cross Product Approach (Multiplication)
      vii. Rectangular Array Approach (Multiplication)
      viii. Repeated Subtraction Approach (Division)
      ix. Sharing (Division)
      x. Missing Factor (Division)

   See **Activity 3.3** and p.93ff 7, 8, 9, 41
3. Be able to construct a word problem for each conceptual approach in Question 5b.
4. Use the number line to illustrate
   a. integer addition or subtraction
   b. integer multiplication or division

   See **Activity 3.4** and p.93ff 11 and supplementary handout
6. Use the particle charge model to illustrate
   a. integer addition or subtraction
   b. integer multiplication or division.

   See supplementary handout
7. Use a patterned model to illustrate integer multiplication or division. See **Activity 3.5**
8. Demonstrate the correct use of **addition** in *any* base using these algorithms:
   a. scratch addition. See p.93ff 12, 31
   b. partial sums. See supplementary handout
   c. lattice addition. See supplementary handout
9. Demonstrate the correct use of **multiplication** in *any* base using these algorithms:
   a. a grid. See supplementary handout
   b. partial products. See supplementary handout
   c. lattice multiplication. See p.93ff 13, 32 and supplementary handout
10. Demonstrate the correct use of **subtraction** in *any* base using these algorithms:
    a. expanded form (or standard form) regrouping. See supplementary handout
    b. expanded form (or standard form) Austrian subtraction (or equal additions)

    See p.93ff 15 and supplementary handout
11. Use algorithms to solve problems. See **Activity 3.11** 1-3 and p.93ff 33, 34.
12. Show how to use compatible numbers for mental arithmetic. See supplementary handout.
13. Demonstrate the correct use of **division** in any base using scaffolding. See supplementary handout
14. Be able to explain why particular algorithms work.