**Exam I**

Math 303–Fall 2010 Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Show all work and use complete sentences to write any required explanations.*

(14) 1. Fill in each blank with the appropriate word, phrase, or symbols.

(a) The numerals 6 and 5 in the multiplication number sentence 6 × 5 = 11 are called \_\_\_\_\_\_\_\_\_\_\_.

(b) Let *A* and *B* be two finite sets such that *B* ⊆ *A,* *n*(*A*) = *a* and *n*(*B*) = *b*. Then *a* – *b* = \_\_\_\_\_\_\_\_\_\_.

(c) State the three key characteristics of the Hindu-Arabic numeration system:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

(d) Today, the 8th day of February in the year 2010, is the eleventh day of class for Math 303.

Eleven is classified as a/an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ number.

(e) ooo ooo This illustration is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ model for 6 ÷ 2 = 3.

(4) 2. (a) Use the set definition of *less than* (b) Use the whole number addition definition of

to show 2 < 6. *less than* to show 2 < 6.

(6) 3. (a) Write 342five in base ten. (b) Write 69 in base four.

(6) 4. Given the set *A* = {☺, ☼, ◊, \*, #, $}.

(a) Find the cardinal number for set *A*.

(b) Construct a one-to-one correspondence to illustrate and justify your answer to part (a).

(c) How many distinct one-to-one correspondences could be formed to give correct solutions

to part (b)?

(3) 5. Is *x* ∙ *x* ever equal to *x*? Explain your answer.

(3) 6. Write the numerals for the first fifteen counting numbers in base three.

(3) 7. Write the set definition for addition of whole numbers.

(3) 8. Indicate whether the statement is true or false. Justify your answer.

7 ÷ 0 = 0

(6) 9. Identify the model, and then symbolize the problem and solution.

(a) (b)

0

1

2

3

4

5

6

7

8

9

10

11

12

6

4

(c)

(3) 10. Is there a Closure Property for the Division of Whole Numbers? Justify your answer.

(3) 11. Rewrite the subtraction problem 9 – *x* = 2 as an equivalent addition problem.

(12) 12. Each of the following is an example of one of the properties for addition or multiplication of whole numbers. Identify the property illustrated.

(a) (6 + 3) + 5 = 6 + (3 + 5)

(b) (3 + 4)(5 + 6) = (3 + 4)5 + (3 + 4)6

(c) 5 + 0 = 5

(d) 6 ∙ (5 ∙ 4) = 6 ∙ (4 ∙ 5)

(3) 13. Write the fact family for 8 × 3 = 24.

(3) 14. Rewrite 3 ∙ 106 + 4 ∙ 103 + 5 as a base-ten numeral.

(6) 15. A telemarketer surveyed, 100 people about their voting habits. Three questions were asked:

"Have you ever voted for a Democrat?", "Have you ever voted for a Republican?", and "Have you

ever voted for a candidate from another party or an independent candidate?" The results were:

67 Democrat 52 Democrat and Republican 1 all three

70 Republican 8 Democrat and other/independent

13 other/independent 4 Republican and other/independent

(a) Construct a Venn Diagram for the data.

(b) How many people have only voted for   
another party or an independent candidate?

(c) How many people said Democrat or Republican,   
but not other/independent?

(3) 16. Find the solution for 3*x* + 7 = *x* + 13.

(4) 17. Complete the table for the basic facts for multiplication in base four.



(12) 18. For the following problem:

(i) Express the problem in terms of an operation on whole numbers.

(ii) Identify an appropriate model for the problem and use the model to illustrate the solution.

(iii) State the solution in a complete sentence.

(a) Terry has three shirts with different designs and two different colored slacks. How many different choices for shirt-slack outfits does Terry have?

(b) Rob has eleven pencils. Kelly has five pencils. How many more pencils does Rob have than Kelly?

(c) Jamie’s dog, Rover, weighed nine pounds before she became sick. Rover has now lost two pounds while being sick. How much does Rover now weigh?

(6) 19. Consider the sequence: 7, 11, 15, 19, 23, 27, …  
  
(a) Find the next three terms. (b) Find the 100th term. (c) Find the *n*th term.