

MA201 Test 1 - 9/29/09

Name: \_\_\_\_\_

Section: \_\_\_\_\_

**Directions:**

Please print your name clearly. This is a 75 minute exam and is worth 15% of your final grade. There are 100 points possible. Calculators may not be used on this exam. **Answers without work will receive little or no credit** Good luck!

<b>Problem</b>	<b>Points possible</b>	<b>Points earned</b>
1	15	
2	5	
3	5	
4	15	
5	10	
6	15	
7	5	
8	5	
9	5	
10	15	
11	5	
<b>Total</b>	100	
<b>+ bonus</b>		
<b>Final Score</b>		

1. Let  $U = \{x \mid x = 4n, n \leq 10, n \text{ is a natural number}\}$  be the universe.

(a) (5 pts.) Write  $U$  in list notation.

(b) (5 pts.) If  $A = \{0, 8, 16, 24, 32, 40\}$ , what is  $\bar{A}$  in list notation?

(c) (5 pts.) Let  $B$  be any set. What is  $B \cap \bar{B}$ ? Explain.

2. (5 pts.) Let  $A$ ,  $B$ , and  $C$  be sets. Use Venn diagrams to prove that  $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$ . Explain, in complete sentences, what your pictures means.

3. (5 pts.) Use the rectangular array model of multiplication to illustrate the distributive property. Explain, in complete sentences, what your picture means.

4. Fifty people were surveyed. 23 people owned a dog, 18 owned a cat, and 11 owned a hamster. 5 owned a dog and a cat, 4 owned a dog and a hamster, and 3 owned a cat and a hamster. Only 1 owned all three.

(a) (5 pts.) Draw a Venn diagram that shows these results. Make sure you label your sets clearly.

(b) (5 pts.) How many people own only one pet?

(c) (5 pts.) How many people own exactly two pets?

5. Solve the problem  $15 \cdot 384$  using the following methods:

(a) (5 pts.) Expanded notation.

(b) (5 pts.) Instructional algorithm.

6. (a) (5 pts.) Write  $231_{\text{five}}$  in base 10.

(b) (5 pts.) Write the decimal (base 10) number 47 in base 5.

(c) (5 pts.) Compute  $132_{\text{five}} + 124_{\text{five}}$

7. (5 pts.) Use mats, strips, and units to model the addition  $145 + 256$ . Explain any exchanges made.

8. (5 pts.) Use the scaffold algorithm to perform the division  $1209 \div 23$ .

9. (5 pts.) Explain why  $5 \div 0$  is undefined. Make sure you write your answer in complete sentences.

10. Use a number line to model the following operations.

(a) (5 pts.)  $5 + 4$

(b) (5 pts.)  $9 - 4$

(c) (5 pts.)  $5 \cdot 3$

11. (5 pts.) Is the set  $\{0, 1, 2, 3, 4\}$  closed under addition? Explain why or why not.

12. (BONUS: 5 pts.) What is  $1010111001_{\text{two}}$  in base 10?

13. (BONUS: 5 pts.) Compute  $241_{\text{five}} - 142_{\text{five}}$ .