MA 137 Exam One Review Problems

Note: This is NOT a practice exam. It is a collection of problems to help you review some of the material for the exam and to practice some kinds of problems. This collection is not necessarily exhaustive; you should expect some problems on the exam to look different from these problems.

1. Consider the sets:
   $R = \{\text{Badgers, Buckeyes, Boilers}\}$
   $S = $ The set of words beginning with "B."
   Answer "True" or "False," and explain why.
   a. $R \subset S$
   b. $\text{Boilers} \in S$
   c. $R \cap S = \varnothing$
   d. $\text{Beryllium} \in R'$

2. Consider the sets:
   $A = \{0, 5, 10, 20\}$
   $B = \{5, 10, 15, 20\}$
   Is A a subset of B? Is B a subset of A? Explain briefly. What is $A \cup B$? What is $A \cap B$?

3. If P is the set of all Purdue students and B is the set of all Indiana residents, then describe in words the set $P \cap B'$.

4. Using minimal collections of base-five pieces to represent the given number of unit squares, fill in the blank spaces in the table below:

Number of unit squares	Long-flats	Flats	Longs	Units
48				
268				
	1	3	3	0

5. Sketch the number pieces for each collection, and report the number of total units represented by each number.
   a. 342_{five} b. 1122_{three} c. 602_{eight}

6. Represent the pieces needed to represent 450 total units in the following different bases. Your work should include a sketch of the pieces and the numeral in the correct base notation.
   a. Base six   b. Base twelve   c. Base seven

7. Robin counted her collection of stuffed elephants and proclaimed "I have 103 elephants!" Her brother said: "No, silly, you have 19. I counted them myself!" Robin has been learning about numbers in different bases. Her brother knows only about base ten. In what base was Robin reporting her count? Explain how you know.
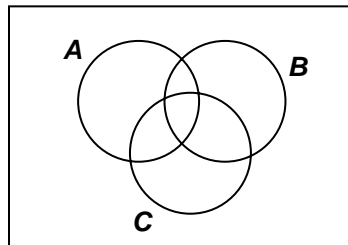
8. Darkly shade the regions listed:
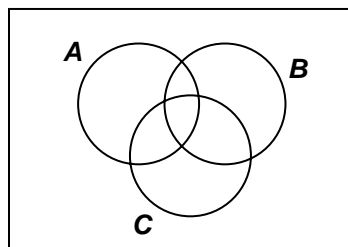
   a. $A \cap (B \cup C)$
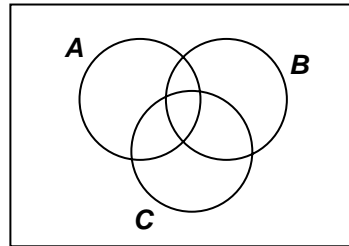
   b. $(A \cup C) \cap B$
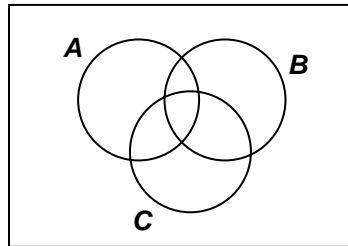
   c. $B' \cap (A' \cap C)$

   d. (This one is harder than anything I'd put on an exam)
      $((A \cap C) \cap B') \cup ((B \cap C) \cap A')$

9. In a fraternity with 30 members, 18 take mathematics, 5 take both mathematics and biology, and 8 take neither mathematics nor biology. How many take mathematics but not biology?
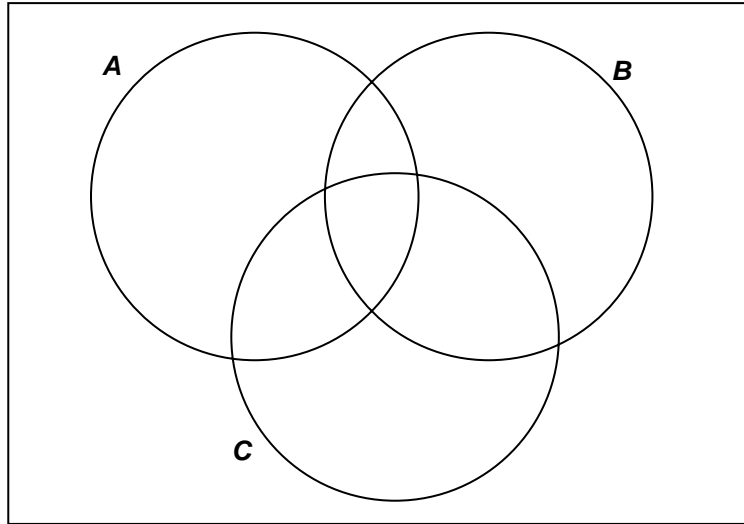
10. Write the letters in the appropriate sections of the following Venn diagram using the following directions:

Set *A* contains the letters in the word *Iowa.*
Set *B* contains the letters in the word *Hawaii.*
Set *C* contains the letters in the word *Ohio.*
The universal set contains the letters in the word *Washington.*

11. Do problems 1–4 on page 121.

12. Review examples A–G in the textbook (pages 125–129). Can you use the different numeration systems to write numbers? To practice, try problem 1 on page 210.

13. Use the Venn diagram to represent the following situation, then answer the questions that follow:

45 Purdue freshmen were asked about the Purdue landmarks they had visited. Three students had visited Slayter Hill, Hort

Park, and John Purdue's Grave. Eighteen students had been to Slayter Hill. Twenty students had been to John Purdue's Grave. Eight students had been to John Purdue's Grave and Hort Park. Seven students had been to Hort Park and Slayter Hill. Eight students had been only to Hort Park, and seven students had only visited John Purdue's Grave."
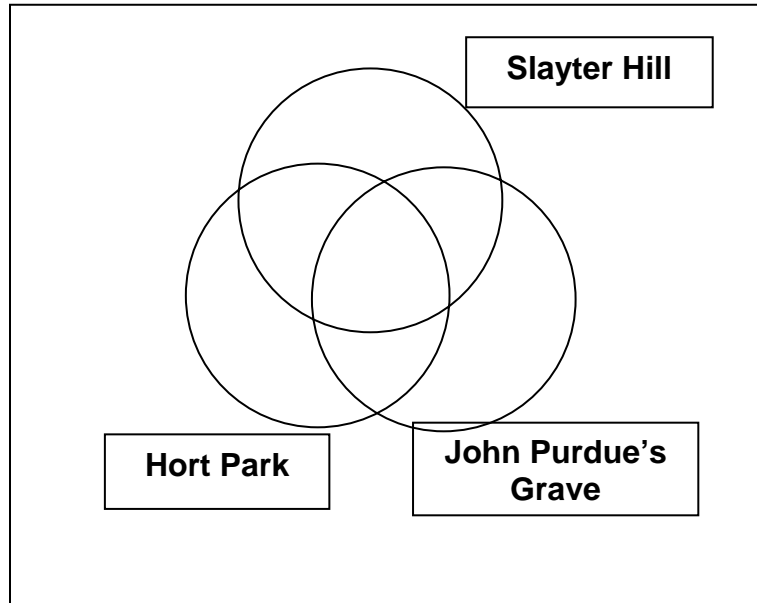
a. How many of these had visited Slayter Hill and John Purdue's Grave only?

b. How many of these students hadn't visited any of the three landmarks?

c. How many of the students that did not visit John Purdue's Grave did visit Hort Park?