MA 110-06 §1.1 - 3.2 <b>Test #1</b>	score	Name:4 October 2001
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- 1. Use a properly labeled Venn diagram to determine the validity of the following argument. *Explain. (9 points)* 
  - 1. All mechanics are men.
  - 2. Sue is a mechanic.

Therefore, Sue is a man.

2. Construct a truth table to show that the inverse of the symbolic statement  $p \rightarrow q$  is logically equivalent to its converse. (9 points)

If the defendant goes to jail, then the defendant is not innocent. If the defendant's lawyer is good, then the defendant does not go to jail. The defendant does not go to jail. Therefore, the defendant is innocent or the lawyer is good.

<sup>3.</sup> Write the following argument in symbolic form. Then use a complete truth table to determine if the argument is valid. *(9 points)* 

4. If  $U = \{a, b, c, d, e, f, g, h, i, j, k, l, m, n\}$ ,  $A = \{a, b, c, g, k, l\}$  and  $B = \{a, c, e, f, g, k, m\}$ , find the set  $A \cup B'$ . Then illustrate  $A \cup B'$  by shading the result in a Venn diagram. (9 points)

5. List all the subsets of the set  $\{a, b, c\}$ . In general, if *A* is a set with n(A) = k, how many subsets of *A* are there? Explain. (9 points)

6. In a group of 200 students, 75 enjoy reading math books, 126 enjoy reading physics books, and 55 don't enjoy books of either subject (although they wish they did). How many of the students enjoy reading both math and physics books?

Draw a properly labeled Venn diagram and explain your reasoning. (9 points)

<sup>7.</sup> From a group of 10 people, in how many ways can 4 of them be selected and lined up in a row? In how many ways can 4 of the 10 be selected for membership on a committee? *(9 points)* 

8. You are arranging your opera compact disks on a shelf at home. There are 3 CDs of Puccini, 4 of Wagner, and 5 of Verdi. In how many ways can they be arranged on the shelf? In how many ways can they be arranged if CDs of the same composer must be adjacent? Explain. *(10 points)* 

9. From a group of 7 men and 10 women, how many different ways are there to choose a 5-person committee consisting of 3 women and 2 men? Explain your counting argument. *(9 points)* 

10. From a standard 52-card deck, how many different 5-card hands consist of four cards in one suit with the fifth card in a different suit? Explain. *(9 points)* 

<sup>11.</sup> A coin is flipped three times and the result of each flip is recorded. Write out the sample space for this three-flip experiment. Then find the probability that the three flips result in more heads than tails. Explain. *(9 points)*