MA 110-02 §1.1 – 2.4	**Test #1**	*score*	**Name:** _____ **26 June 2001**

1. Use a properly labeled Venn diagram to determine the validity of the following argument. Explain. *(10 points)*

   1. All politicians enjoy helping people.
   2. Sue enjoys helping people.

   Therefore Sue is a politician.

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2. Construct a truth table to show that the symbolic statement $p \rightarrow q$ is logically equivalent to its contrapositive. *(10 points)*

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3. Write the following argument in symbolic form. Then use a truth table to determine if the argument is valid. *(10 points)*

   If a student studies regularly, then the student does well in school. If the student's teachers are good, then the student does well in school. The student does not do well in school. Therefore, the student doesn't study regularly or the student's teachers are not good.

4. Which two of the following statements are logically equivalent? (You don't need to use a truth table, but explain why they are in a sentence.) *(10 points)*

   (a) If it is not raining, then I play tennis.

   (b) If I play tennis, then it is not raining.

   (c) If it is raining, then I don't play tennis.

   (d) I hate tennis, therefore I don't play tennis.

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5. If $U = \{a, b, c, d, e, f, g, h, i, j, k, l, m\}$, $A = \{a, c, d, g, j, k, m\}$ and $B = \{a, c, e, g, i, k, m\}$, find the set $(A \cap B)'$. Then illustrate $(A \cup B)'$ by shading the result in a Venn diagram. *(10 points)*

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6. In a group of 250 students, 165 enjoy attending basketball games, 126 enjoy attending baseball games, and 61 enjoy neither? How many of the students enjoy both?

   Draw a properly labeled Venn diagram and explain your reasoning. *(10 points)*

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7. Compute the numbers ${}_7P_3$ and ${}_7C_3$. Make up two counting problems that would have these numbers as an answer. *(10 points)*

8. In how many ways can 6 girls and 4 boys be lined up in a row (without regard to gender)? In how many ways can this be done if children of the same gender are adjacent? Explain your counting argument. *(10 points)*

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

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10. How many different 5-card hands have exactly three hearts? Explain. *(10 points)*