MA 110-91
§1.1 – 2.4

Test #1

score

Name: —————————————

21 February 2002

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

   1. All mechanics are men.
   2. Sue is a mechanic.

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   Therefore Sue is a man.

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

3. Write the following argument in symbolic form. Then use a truth table to determine if the argument is valid. *(10 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. Therefore, the defendant is innocent or the lawyer is good.

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

5. List all of the subsets of the set $\{a,b\}$. Then list all the subsets of the set $\{a,b,c\}$. *(10 points)*

6. In a group of 200 students, 75 play tennis, 126 play racquetball, and 61 play neither? How many of the students play both tennis and racquetball?

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

7. Compute the numbers $_5P_2$ and $_5C_2$. For the set $\{a,b,c,d,e\}$, list all the subsets of cardinality two and explain how this list is related to one of the numbers you just computed. *(10 points)*

8. In how many ways can 5 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)*

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. *(10 points)*

10. How many different 5-card poker hands consist of four cards in one suit with the fifth card in a different suit? Explain. *(10 points)*