Math 365 Exam 2
October 22, 2010
S. Witherspoon

Name____

There are 8 questions, for a total of 100 points. Point values are written beside each question. *No calculators allowed. Show your work for full credit.*

1. [10] Construct a truth table for the proposition $(\sim p) \wedge q$.

2. Consider the following proposition about all integers a, b, and c.
   p: If $ab = ac$, then $b = c$.

   (a) [5] Is p true? If not, give a counterexample.

   (b) [5] State the *converse* of p. Is it true? If not, give a counterexample.

3. How many one-to-one correspondences are there between the sets $\{a, b, c, d\}$ and $\{1, 2, 3, 4\}$ if

(a) [5] in each correspondence, d must correspond to 1?

(b) [5] in each correspondence, a and c must each correspond to an odd number?

4. [15] Of 91 children playing baseball, football, or soccer, 52 play baseball, 33 play football, 23 play soccer, 12 play baseball and football, 3 play football and soccer, and 2 play all three sports. How many play baseball and soccer?

5. [10] For a concert, 57 tickets were sold for a total of \$205. If students paid \$3 and nonstudents paid \$5, how many student tickets were sold?

6. [15] Find the first two terms of an arithmetic sequence in which the fifth term is 4 and the eleventh term is -8.

7. Suppose the letters A, B, C, D, E, F, G represent children on a playground, and an ordered pair (A, B) indicates that A *is the sister of* B. Answer the following questions based on the complete list of such ordered pairs below.

$$\{(A, B),\ (A, C),\ (C, A),\ (C, B),\ (E, D),\ (F, G),\ (G, F)\}$$

(a) [5] What letters represent boys?

(b) [5] Is this set of ordered pairs a function from the set of first components to the set of second components?

8. [20] (**True/False.**) For each of the following statements, write "T" if it is true and "F" if it is false. (You need not give counterexamples for false statements.)

(a) __________ For all sets A, B: If $A - B = \emptyset$, then $A = B$.

(b) __________ For all sets A, B: $(A - B) \cup A = A$.

(c) __________ For all sets A, B, C: If $A \cup B = A \cup C$, then $B = C$.

(d) __________ For all integers x and y: $|x - y| = |y - x|$.

(e) __________ For all integers x: $|x| + |-x| = 0$.