Math 365   Exam 2
October 22, 2010
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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 $(\sim p) \vee q$.

2. Consider the following proposition about all integers x, y, and z.
    p: If $xy = xz$, then $y = z$.

    (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, a must correspond to 4?

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

4. [15] Of 86 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, 61 tickets were sold for a total of $266. If students paid $4 and nonstudents paid $6, how many student tickets were sold?

6. [15] Find the first two terms of an arithmetic sequence in which the fourth term is 1 and the tenth term is -17.

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

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

(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 $A \subseteq B$.

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

(c) _____ For all sets A, B: $(A - B) \cup A = A$.

(d) _____ For all integers a and b: $|a - b| = |b - a|$.

(e) _____ For all integers a: $|a| + |-a| = 0$.