## Math 365-502 Final Exam May 12, 2009 S. Witherspoon

Name\_

(b)  $[4] 10.1_{\text{four}}$ 

There are 16 questions, for a total of 100 points. Point values are written beside each question. No calculators allowed. Show your work for full credit.
1. [4 points] Find the sum $1201_{\text{five}} + 344_{\text{five}}$ .
2. Convert the following numbers from base four to base two. (a) [4] $131_{\rm four}$

3. [5] Find the sum  $2+4+6+8+\cdots+100$ .

4. [5] Marty believes that  $0 \div 0 = 0$  because "0 divided by anything equals 0." What could you tell Marty to correct his reasoning?

5. [4] Construct a truth table for  $p \wedge q$ .

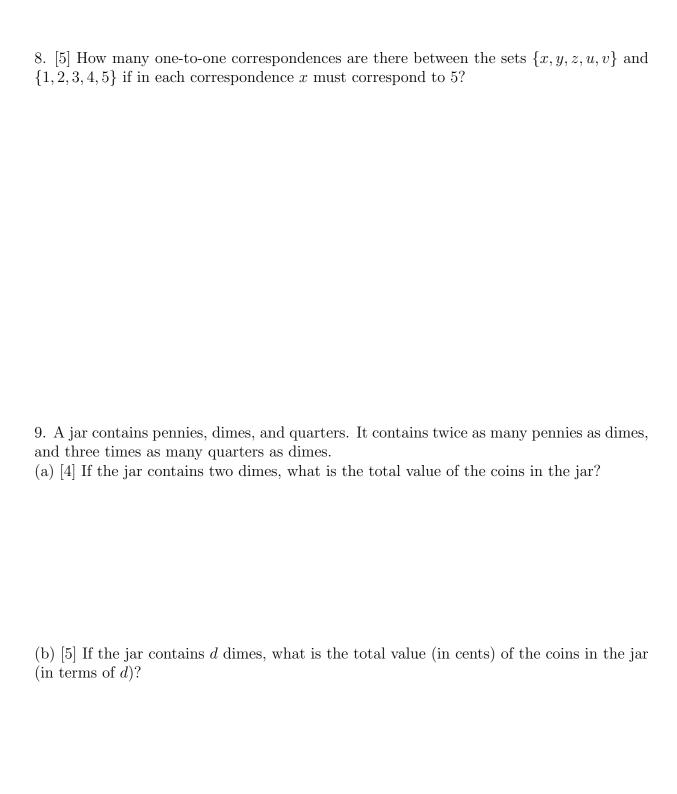
6. Consider the following proposition about all whole numbers a, b, and d.

$$p$$
: If  $d \mid a$  or  $d \mid b$ , then  $d \mid ab$ .

(a) [4] Is p true? If not, give a counterexample.

(b) [4] State the converse of p. Is it true? If not, give a counterexample.

- 7. [4] Let  $A = \{1, 2, 4, 8\}, B = \{1, 2, 3, 4\}, \text{ and } C = \{5, 6, 7, 8\}.$  Find the following:
- (a)  $A \cup B =$ \_\_\_\_\_
- (b)  $A \cap C =$ \_\_\_\_\_
- (c) A B =\_\_\_\_\_
- (d)  $B \cap C =$



10. [6] Of 96 language students taking Spanish, French, or Chinese courses, 60 take Spanish, 46 take French, 19 take Chinese, 22 take both Spanish and French, 5 take both Spanish and Chinese, and 2 take all three languages. How many take French and Chinese?

(a) 2	(b) 3
(c) 4	(d) 5
(e) 9	(f) 11

12. [6] In an arithmetic sequence, the sixth term minus the first term equals 10. The sum of the first and the sixth term is 4. Find the fourth term of the sequence.

11. [6] Test the number 21,978 for divisibility by each of the following numbers. If it is

divisible by the number, write "yes" in the blank, and otherwise write "no."

13. Find the simplest form for each of the following:

(a) [4] 
$$2\frac{1}{2} \div \frac{3}{4}$$

(b) 
$$[4] \left(\frac{2}{3}\right)^3 - 42 \div 7 \cdot \frac{2}{9}$$

(c) [4] 
$$\frac{x^2 - y^2}{x^2 - xy}$$

- 14. Convert the following decimals to fractions:
- (a)  $[4] 0.\overline{18}$

(b)  $[4] 12.1\overline{3}$ 

