**Instructor: Prof. A. Suciu** **Name:** ______________________

**MTH 1101** **Applications of Algebra** **Spring 2000**

# QUIZ 4

**Instructions**: Put your name in the blanks above. Put your final answers to each question in the designated spaces on these pages. Show your work—if there is not enough room, use another sheet.

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**(1)** Let $U = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$, $A = \{0, 2, 4, 6, 8, 10\}$, $B = \{1, 2, 3, 6, 9\}$, $C = \{0, 5, 6, 7\}$.

(a) Find each of the following:

(i) $B' =$

(ii) $A \cap C =$

(iii) $A \cap B' =$

(iv) $A \cup B' =$

(v) $A \cap A' =$

(vi) $(A \cup B) \cap C =$

(vii) $(\emptyset \cup B) \cap (\emptyset \cup C) =$

(viii) $(\emptyset \cap B) \cap U =$

(b) Determine whether each of the following is true or false:

(i) $0 \in C$ ______________

(ii) $0 \notin A$ ______________

(iii) $B \subseteq C$ ______________

(iv) $\emptyset \not\subseteq C$ ______________

**(2)** In a poll, 100 students were asked which color they prefer. Multiple preferences were allowed. Of the sudents polled, 20 preferred red, 30 preferred green, 40 preferred blue, 8 preferred both red and green, 15 preferred both blue and green, 12 preferred both blue and red, 5 preferred blue, red, and green, and the others expressed different preferences (such as orange).

(a) Draw a Venn diagram with this information.

(b) How many of the students polled prefer

(i) Any color except blue, red, or green?

(ii) At least two of these colors?

(iii) Only the color blue?

(iv) Green or red, but not blue?

**(3)** List the elements in the set $S$, where $S$ is defined by:

(a) $S = \{\, x \mid x \text{ is an even integer, greater than } -7, \text{ and less than } 5 \,\}$

(b) $S = \{\, x \mid x$ is a letter in the word "MATHEMATICS", but not in "ALGEBRA" $\}$

**(4)** Let the universal set $U$ be the set of students enrolled in this math class, let $F$ be the set of female students, let $E$ be the set of students taking English (in addition to math), and let $H$ be the set of students taking History (in addition to math).

(a) Describe the following sets in terms of unions, intersections and/or complements:

$\{$ all male students taking English or History $\} =$

$\{$ all female students not taking History $\} =$

(b) Describe in a sentence the set defined $(F \cap E) \cup (F' \cap H)$.