MATH 170: PRACTICE EXAM 01

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Answer the questions in the spaces provided on the question sheets and turn them in at the end of the class period. Unless otherwise stated, all supporting work is required. You may only use a four-function calculator. No graphing calculators or cell phones are allowed.

Name: _____

1. Problems

Let $S = \{\text{Burton, Ride, Forum, Völkl, LibTech, Gnu, Rome}\}$. Let $X = \{\text{Burton, Ride, Forum}\}$, $Y = \{\text{Forum, Völkl, LibTech, Gnu, Rome}\}$, $Z = \{\text{Ride, Forum, Völkl}\}$, and $W = \{\text{Burton, Gnu, LibTech}\}$.

1. *Compute*

(a) $X \cap Y$,

(b) $X \cup Z$,

(c) The complement of Z *in* S, Z'.

Date: February 4, 2015.

2. *Use the sets in number 1 to compute the following:*

(a) What is the cardinality of $X \times Z$*?*

(b) What is the cardinality of $Y \cup Z$*?*

(c) What is the cardinality of $X \cap Y$*?*

(d) What is the cardinality of $X \cap Y \cap Z$*?*

(e) What is the cardinality of $Z \cap W$*?*

3. *If* $n(A) = 45$*,* $n(B) = 18$*, and* $n(A \cap B) = 5$*, find* $n(A \cup B)$*.*

4. *Your favorite restaurant offers a total of 13 desserts, of which 9 have ice cream as a main ingredient and 9 have fruit as a main ingredient. Assuming that all of them have either ice cream or fruit or both as a main ingredient, how many have both?*

5. *Use a truth table to prove the following logical equivalences. Explain why the equivalence holds.*

(a)

$$\sim (p \vee q) \equiv \sim p \wedge \sim q.$$

(b)

$$\sim (p \wedge q) \equiv \sim p \vee \sim q.$$

(c)

$$p \Rightarrow q \equiv \sim p \vee q.$$

6. *Use a truth table to prove the following is a tautology. Explain why it is a tautology.*

$$(p \Rightarrow q) \vee (q \Rightarrow p)$$

7. *How many different five-letter sequences can be formed with the letters* a, a, a, b, c*?*

8. *Professor Easy's final exam has 12 true-false questions followed by 3 multiple-choice questions. In the multiple-choice questions, you must select the correct answer from 5 choices. How many answer sheets are possible?*

9. *Caculate the following:*

(a) $7!/5!$

(b) $P(2,2)$

(c) $P(9,4)$

(d) $C(6,5)$

10. *If 12 businesspeople have a meeting and each pair exchanges business cards, how many business cards, total, get exchanged?*

11. *A bag contains 4 red marbles, 1 green one, 1 lavender one, 3 yellows, and 2 orange marbles. How many sets of four marbles include one of each color other than lavender?*