Name: ________________________________________________________________

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<th>Problem</th>
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<td>Possible</td>
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<td>Received</td>
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**DO NOT OPEN YOUR EXAM UNTIL TOLD TO DO SO.**

You may use one page (one side) of notes, but no other materials or resources (such as a calculator, notes, old HW, etc.).

**There is no sharing with a friend or neighbor.**

**FOR FULL CREDIT, SHOW ALL WORK RELATED TO FINDING EACH SOLUTION.**

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**Deer Halloween**

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**CLOSE TO HOME By John McPherson**

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**Before giving out candy, the Gernsteads required that trick-or-treaters first watch a short video on dental care.**
1. Some set questions:

Shade in the set \((R \cup S \cup T) \cap (R' \cup S' \cup T')\).

What set does the following diagram represent?

One hundred people were asked whether they surf and whether they like to swim.
70 said they like to swim or surf (or both), 20 said they like to do both, and 30 said they don’t like to swim. How many like to surf only (i.e. and not swim)?

Write in simplest terms (using A, B and/or C, as well as the universal and/or empty sets):

\((A' \cup B)' = \)

\(((A' \cup B) \cap C')' = \)

\((A' \cup B' \cup C') \cap (A' \cup B' \cup C')' = \)

\((A \cup B \cup A')' = \)
2. In answering the following questions, except where noted (those on the final page), do not simplify the answers. For example, leave your answer in the form \( C(5,3) \) or 12! or \( P(4,3) \cdot P(7,4) \) or \( 2^5 - 2^3 \) or \( 7 \cdot 6 \cdot 5 \cdot 4 \).

How many different meals can be chosen if there are 3 appetizers, 8 main dishes, and 9 desserts, assuming a meal consists of one item from each category?

In how many ways can 3 people be chosen from 7?

In how many 7-digit numbers (i.e. 1000000 – 9999999) are there in which exactly 2 of the digits are the same?

In how many 7-digit numbers (i.e. 1000000 – 9999999) are there in which at least one digit is different from the others, i.e. the 7 digits are not all the same?

Suppose you have 7 friends that you are considering inviting to a movie. How many different groups of friends of any size (i.e. 3 friends, or 5 friends, or no friends, or all 7 friends) could you invite?

In how many ways can 14 different books be distributed to 14 persons?

In how many ways can 16 copies of the same book be distributed to 14 persons, where everyone must get at least one copy of the book?
For the next four questions, consider a standard deck of 52 cards, from which you will choose 5 cards. We don’t care what order the cards are chosen in, just what the cards are.

/4 In how many ways can you choose 5 cards?

/4 In how many ways can you choose 5 cards and have exactly 2 of them be Aces?

/4 In how many ways can you choose the 5 cards and end up with the straight consisting of 3, 4, 5, 6, 7?

/4 In how many ways can you choose the 5 cards and have a full house (2 of one number and 3 of another)?

For the next four questions, consider that in California, a typical license plate for a car has a number, then three letters, then three numbers. Assume each number can be from 0 through 9.

/4 How different license plates could there be?

/4 How many different license plates with no repetition of numbers or letters could there be?

/4 How different license plates are there in which exactly two of the numbers and two of the letters are the same?

/4 How many different license plates could there be if you simply needed four numbers and three letters, in any order, and repetition is allowed?
For the next five questions, suppose there are four boys and five girls at a party. For these problems, simplify the answers, i.e. give actual numbers (and show work).

/4 In how many different ways could we choose one couple (one boy, one girl)?

/4 In how many different ways could we choose two couples, where one couple will be king and queen for the evening, and the other will be duke and duchess?

/4 In how many different ways could we choose any 4 of them (of either gender)?

/4 In how many ways can they be seated in a row such all girls are next to each other and all boys are next to each other? (Don’t simplify this answer.)

/4 In how many different ways could we choose a female president, female vice-president, and female secretary?