NAME:_____

This quiz contains 4 problems worth 30 points. You may not use books, notes, or a calculator. You have 30 minutes to take the quiz.

   NOTE: As we discussed in class on Monday, Problem 1 on the quiz requires you to give simplified numerical answers (for example 102 or 17/15). For all other problems, you may give an unsimplified numerical answer (for example $12! \cdot 7!/4!$ or $12 \cdot P(10,6) \cdot C(18,6)$).

1. (2 points each) Calculate the following. Your answers must be in simplified numerical form. Any fractions must be in lowest terms.

   (a) $P(8,3)$

   (b) $P(5,5)$

   (c) $C(10,7)$

   (d) $C(14,1)$

2. (2 points each) The eight letters in the set $X = \{A, B, C, D, E, F, G, H\}$ are used to form strings of length 5. Assume you are allowed to repeat letters when forming a string. So, for example, $ABFFA$ is an allowable string.

   (a) How many strings can be formed?

   (b) How many strings begin with the letter A

   (c) How many strings contain the letter A? (This questions could be rephrased as: How many strings contain at least one A?)

3. (2 points each) The eight letters in the set $X = \{A, B, C, D, E, F, G, H\}$ are used to form strings of length 5. Assume you are NOT allowed to repeat letters when forming a string. So, for example, $CDGHA$ is an allowable string but $AABBC$ is not.

   (a) How many strings can be formed?

   (b) How many strings contain the substring AB?

   (c) How many strings contain the substring AB or the substring CDE?

4. (2 points each) A local bookstore has a "freebie" table holding a total of 21 books, all distinct. Six of the books are math books, seven are history books, and eight are computer science books. You are going to select 6 books from the table. Assume the order in which you select the books does not matter.

   (a) In how many ways can you select 6 books?

   (b) How many selections contain exactly 3 math books?

   (c) How many selections have at most 2 history books?

   (d) How many selections have at least two of the three subjects represented?

5. (2 points) How many binary strings of length 20 contain exactly 6 ones. (Recall, *binary* means strings of 0's and 1's.)