Enumerative Combinatorics Homework 1

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due Friday, January 12, 2024

1 Instructions

In the first lecture, we discussed the following counting problems:

- n^k, the number of k-element sequences of elements of $[n]$.

- $(n)_k$, the number of k-element sequence of elements of $[n]$ with no repetitions.

- $n!$, the special case $(n)_n$, which is the number of permutations of $[n]$.

- $\binom{n}{k}$, the number of sets of size k with elements from $[n]$.

- $\left(\!\binom{n}{k}\!\right)$, the number of multisets of size k with elements from $[n]$.

Solve each of the word problems below using the appropriate expression. You do not need to simplify to a number.

Example: The number of 6-character passwords whose characters can be uppercase letters, lower-case letters, or numbers.

Solution: 62^6.

2 Problems

1. The number of distinguishable ways to fill an M&M bag with 100 M&M's of 6 different colors (brown, yellow, green, red, orange, and blue).

2. The number of ways to choose the 1st, 2nd, and 3rd place winner in a competition with 50 participants.

3. The number of ways to split a 13-student class into two teams: one with 6 students and one with 7 students.

4. The number of anagrams of the word "thousand" (for example, "adhnostu" or "dantuohs").

5. The number of possible 280-character tweets consisting entirely of digits 0–9.