CSL 105: Discrete Mathematical Structures
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1. Discuss Homework-3 and Minor-2 problems.

2. Six swimmers training together either swam in a race or watched the others swim. At least how many races must have been scheduled if every swimmer had opportunity to watch all of the others?

3. Consider the following two theorems:

   Theorem 1 (Permutation with indistinguishable objects) *The number of different permutations of n objects, where there are n_1 indistinguishable objects of type 1, n_2 indistinguishable objects of type $2, ...,$ and n_k indistinguishable objects of type k, is*

   $$\frac{n!}{n_1!n_2!...n_k!}.$$

   Theorem 2 (Distinguishable objects into distinguishable boxes) *The number of ways to distribute n distinguishable objects into k distinguishable boxes so that n_i objects are placed into box i, $i = 1, 2, ..., k$, equals*

   $$\frac{n!}{n_1!n_2!...n_k!}$$

   Prove the second theorem by first setting up a one-to-one correspondence between permutations of n objects with n_i indistinguishable objects of type $i, i = 1, 2, ..., k$ and the distribution of n objects in k boxes such that n_i objects are placed in box $i, i = 1, 2, ..., k$ and then applying the first theorem.

4. In how many ways can you place n distinguishable objects into k indistinguishable boxes?

5. In how many ways can you place n indistinguishable objects into k indistinguishable boxes?