

# CSE 312: Foundations of Computing II

---

## Section 1: Combinatorics

### 0. Birthday Cake

A chef is preparing desserts for the week, starting on a Sunday. On each day, only one of five desserts (apple pie, cherry pie, strawberry pie, pineapple pie, and cake) may be served. On Thursday there is a birthday, so cake must be served that day. On no two consecutive days can the chef serve the same dessert. How many dessert menus are there for the week?

### 1. Photographs

Suppose that 8 people, including you and a friend, line up for a picture. In how many ways can the photographer organize the line if she wants to have fewer than 2 people between you and your friend?

### 2. Rearrangements

Permutations of objects, some of which are indistinguishable.

- (a) How many permutations are there of the letters in DAWGY?
- (b) How many permutations are there of the letters in DOGGY?
- (c) How many permutations are there of the letters in GODOGGY?

### 3. Rabbits!

Rabbits Peter and Pauline have three offspring: Flopsie, Mopsie, and Cotton-tail. These five rabbits are to be distributed to four different pet stores so that no store gets both a parent and a child. It is not required that every store gets a rabbit. In how many different ways can this be done?

### 4. Seating

How many ways are there to seat 10 people, consisting of 5 couples, in a row of 10 seats if ...

- (a) ... the seats are assigned arbitrarily?
- (b) ... all couples are to get adjacent seats?
- (c) ... the seats are assigned arbitrarily, except that one couple insists on not sitting in adjacent seats?

### 5. Bridge

How many bridge hands have a suit distribution of 5, 5, 2, 1? (That is, you are playing with a standard 52-card deck and you have 5 cards of one suit, 5 cards of another suit, 2 of another suit, and 1 of the last suit.)