CS 70   Discrete Mathematics and Probability Theory
Fall 2019   Alistair Sinclair and Yun S. Song   DIS 7

1 Farmer's Market

Suppose you want k items from the farmer's market. Count how many ways you can do this, assuming:

(a) There are pumpkins and apples at the market.

(b) There are pumpkins, apples, oranges, and pears at the market

(c) There are n kinds of fruits at the market, and you want to end up with at least two different types of fruit.

2 Counting Practice

(a) If you shuffle two (identical) decks of cards together, you get a stack of 104 cards, where each different card type is included twice. How many different ways are there to order this stack of cards?

(b) How many different anagrams of GHOST are there if: (1) H is the right neighbor of G; (2) G is on the left of H (and not necessarily H's neighbor)?

(c) There are 20 socks in a drawer, none of which match. How many different ways are there to pair up these socks? (Assume that any sock can be paired with any other sock.)

3 Counting on Graphs

(a) How many distinct undirected graphs are there with *n* labeled vertices? Assume that there can be at most one edge between any two vertices, and there are no edges from a vertex to itself. The graphs do not have to be connected.

(b) How many ways are there to color a bracelet with *n* beads using *n* colors, such that each bead has a different color? Note: two colorings are considered the same if one of them can be obtained by rotating the other.

(c) How many ways are there to color the faces of a cube using exactly 6 colors, such that each face has a different color? Note: two colorings are considered the same if one of them can be obtained by rotating the other.