

Warmup Problems: Section 3.1 #6,8; Section 3.2 #1,2,3,4,5. Do not write up! These are easier or shorter problems intended to check understanding of concepts.

Other Problems: Section 3.1 #11,12,17,18,24c,29,30,31,41; Section 3.2 #24,29,41,42,43. Do not write up! Think about some that look interesting, as time permits. These may be easier or harder than the written problems.

Written Problems: Do five of the following problems. Start work early; the problems take time. The homework is intended to help students become comfortable using the ideas from the course.

Section 3.1 #31 (Hint: Reduce this to the probability that a random permutation has every element in a cycle with one of $\{1, \dots, k\}$, and then consider canonical cycle representations.),36; Section 3.2 #7bc,(14a and 16),44

Additional problem for Section 3.1:

Sicherman dice.

a) Note that a pair of 6-sided dice labeled 1, 2, 2, 3, 3, 4 and 1, 3, 4, 5, 6, 8 has their sum distributed the same as a pair of normal 6-sided dice (*i.e.*, those labeled 1, 2, 3, 4, 5, 6). Using generating functions, prove that these are the only pairs of 6-sided dice labeled with positive integers that have the same sum distribution as a pair of normal 6-sided dice.

b) Determine the pairs of 8-sided dice with positive integer labels that have the same sum distribution as a pair of normal 8-sided dice.

(Hint: You may use Sage, Maple, Mathematica, etc, to factor polynomials.)