Problem 0. (From the book.) Read Sections 3.4, 3.5, 5.1, 5.2, and 5.3 and do the following problems:
Problem Set 10: 5
Problem Set 18: 4
Problem Set 19: 2

Problem 1. Let $X = \{1, 2, \ldots, 90\}$.
   
   i. How many 3-element subsets of $X$ exist such that the sum of the elements is even?

   ii. How many 3-element subsets of $X$ exist such that the sum of the elements is divisible by 3?

Problem 2. A six-sided die in which the faces are numbered 1, 2, 3, 4, 5, 6 is rolled ten times and the numbers which come up are recorded in sequence. How many ways are there to roll the die so that all six sides appear at least once? Notice here that the sequence of rolls corresponding to 1234561234 is different than that which corresponds to 1122334456.

Problem 3. Suppose we roll ten six-sided die simultaneously and record all the numbers which appear in no particular order. How many ways are there to roll the ten die so that all six numbers appear at least once?