CAS CS 131 - Combinatorial Structures
Spring 2013

Problem Set #8 (Counting)
Out: Friday, April 11
Due: Friday, April 18

NO LATE SUBMISSIONS WILL BE ACCEPTED

To be completed individually.

1. Next week, I'm going to get really fit! On day 1, I'll exercise for 10 minutes. On each subsequent day, I'll exercise 5, 6, 7 or 8 minutes more than the previous day. For example, the number of minutes that I exercise on the second day of next week might be 15, 16, 71, 18. How many such sequences are possible (within a week)?

2. From a group of 10 men, 5 women, 4 boys, and 6 girls,

   (a) In how many ways can a man, a woman, a boy, and a girl be selected?

   (b) In how many ways can one person, that is either a man or a girl, be selected?

   (c) In how many ways can one person be selected?

3. How many ways are there to distribute seven different books among twelve people if no person is to receive more than one book?

4. Find an appropriate bijective mapping between a set of sequences and the set in question:

   - In how many ways can k elements be chosen from an $n-$element set $\{x_1, x_2, \cdots, x_n\}$?

   - How many different ways are there to select a dozen donuts if five varieties are available?

   - How many different solutions over the natural numbers are there to the equation: $x_1 + x_2 + x_3 + \cdots + x_8 = 90$? A solution is a specification of the value of each variable x_i. Two solutions are different if different values are specified for some variable x_i.

   - An electronic toy displays a 3×3 grid of colored squares. At all times, three are red, three are green, and three are yellow. How many such configurations are possible?

5. How many *even* numbers in the range 1000–9999 have no repeated digits?

6. How many $n \times n$ matrices are there with *distinct* entries drawn from $\{1, 2, \cdots, p\}$, where $p \geq n^2$?