Math 375: Probability Theory
Spring, 2014
Toews

Quiz 1

Problems:

1. From a group of 7 women and 7 men, a committee consisting of 2 men and 4 women is to be formed. How many different committees are possible? What if one man and one woman refuse to serve together?

2. Suppose you have 3 novels by Dostoyevski, 4 novels by Balzac, and 2 novels by Roth. How many ways are there to arrange these novels on your shelf? What if you insist that the books by Dostoyevski be grouped together and that the books by Balzac be grouped together?

Solutions:

1) a) \( \binom{7}{4} \binom{7}{2} \)

The committee is the outcome of two processes — the first process is that of choosing 4 women, the 2nd is choosing 2 men. By the BPC, the outcome of the committees is the product of the outcome of the processes, i.e.,

\( \binom{7}{4} \binom{7}{2} \)

b) \( \left[ \binom{7}{4} \binom{7}{2} \right] - \left[ \binom{6}{3} \binom{6}{1} \right] \)

The total number of committees, as above

The total number of committees with both, reading

The total number of committees with both reading men and reading woman

The total number of committees with both reading men and reading woman
2) a) Treating each book as distinct, there are
9! orderings.

b) By grouping books by Balzac & Dostoevsky,
there are effectively 4 items to be
ordered: the 2 Bafta books, along with the Balzac
block & the Dostoevsky block. So there are
4! such orderings. For each one, there
are 2! orderings of the Dostoevsky books & 2!
orderings of the Bafta books. So altogether
there are

4! 2! 2! 3!

orderings.