

Math 505a - Qualifying Exam - Fall 2010

February 1, 2015

4: There are $n!$ different orderings of the n books. If it was possible to move from any orderings to another, then the number of days passed before the books are back to original position would be a geometric random variable with success probability $1/n!$. Because, each day the probability of coming back to original position would be $1/n!$. In this case, the expected number of days is $n!$.

In our situation, it is not possible to move to any ordering in one day. However, if we consider that each ordering as a vertex of graph and any possible move as a directed edge. Any two orderings have similar connectivity structure in the graph. Moreover, the graph is connected. The random walk on this graph is aperiodic since every vertex have an edge pointing to itself.

We can conjecture that the expected number of days is $n!$ again.