

MNStatC Probability July Problem

Cheenta Statistics and Analytics Department

Happy National Statistics Day

June 29, 2021

“ Statistics must have a clearly defined purpose, one aspect of which is scientific advance and the other, human welfare and national development. ”

P.C.Mahalanobis

1 Simplex algorithm

1.1 Problem

There are $\binom{n}{m}$ points ranked in order of merit with no matches.

You seek to reach the best, B .

If you are at the j th best, you step to any one of the $j - 1$ better points, with equal probability of stepping to each.

Let r_j be the expected number of steps to reach B from the j th best vertex.

- Show that $r_j = \sum_{k=1}^{j-1} k^{-1}$.
- Give an asymptotic expression for the expected time to reach B from the worst vertex, for large m, n .

1.2 Extra Research

- Read about Simplex Algorithm in LPP on how to reach an optimal solution.
- Try to connect to this problem, and use this result to prove that there always exists a feasible optimal solution in LPP under feasible conditions.