

University of Colorado
Department of Mathematics
Problem of the Month
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N guard stations must be guarded by N guards from 10pm until 2am. To maintain alertness, the guards get reassigned to possibly new stations at midnight. So from 10pm until midnight each guard occupies some station, alone, but at midnight some guards might have to march to other stations and occupy them from midnight until 2am. (To reiterate: at all times, N stations are guarded by N guards with one guard per station, but at midnight some guards might change station.)

A collision will take place somewhere at midnight if the guard of station i has been reassigned to station j , and the guard at station j has been reassigned to station i . Let p_N be the probability that no collision takes place when there are N guards and N stations.

Find $\lim_{N \rightarrow \infty} p_N$.