$q = 1/2, F = 1000, n = 3$ still suffices: the probability is $0.50075050 > 1/2$, while $n = 2$ gives 0.25025025. In the infinite-floor limit the three-passenger probability tends to $1/2$, so strictness matters.

(3) From guard data, estimate destination frequencies with explicit sampling periods, occupancy and missing-data rules; stratify by time, entry floor, group membership and building use. Assess dependence between passengers travelling together. A fitted joint/group model or a validated resampling model is preferable to assuming independent identical draws without checking. No numerical model can be fitted here because no guard observations are supplied.

Structural or analytic derivation

The generating polynomial $\prod_j (1 + p_j z)$ contains every no-collision probability as $n![z^n]$. Its coefficients can be computed by the recurrence $e_k^{(j)} = e_k^{(j-1)} + p_j e_{k-1}^{(j-1)}$. This also gives an exact algorithm for arbitrary nonuniform probabilities and avoids enumerating all F^n assignments.

Comparative cost and preferred method

Coefficient dynamic programming through order n costs $O(Fn)$ arithmetic and $O(n)$ storage, versus F^n assignments in direct enumeration. The special one-favoured-floor formula costs $O(n)$ with running products. A standard birthday-product calculation is already optimal for the uniform model. The rare-collision formula is reported as an approximation and independently checked at each requested threshold.