Source task and conventions

Answer whether Y must contain every page.

Conventional solution and proof

No. Consider two pages with self-links only, and let the teleport support be $S = \{1\}$. Page 1 cannot reach page 2 by a link walk, so the stationary vector is $(1, 0)^\top$ and $Y = \{1\}$. Starting at page 2, a positive teleport probability eventually moves the surfer to page 1; there is no route back. This is compatible with a unique stationary distribution despite reducibility of the full chain. For $0 < \alpha < 1$, Y equals all pages precisely when every page is reachable from some positive-weight seed in the completed link graph.

Structural or analytic derivation

A two-vertex graph gives an exact counterexample and shows why nonempty topic support is weaker than full-support teleportation.

Comparative cost and preferred method

The question is settled by two states and their reachability relation. Numerical iteration or spectral decomposition adds no necessary information. The conventional graph counterexample is the preferred method.