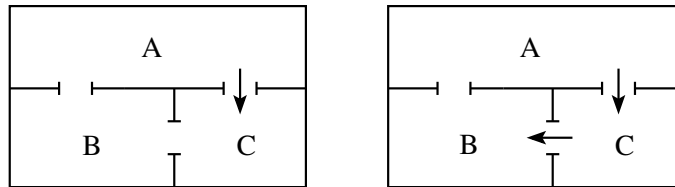


[nex103] **House of the mouse: some one-way doors**

A trained mouse lives in a house with floor plan as shown in two versions. The house has three rooms and three doors. One or two doors are open one way only. A bell rings at regular time intervals, prompting the mouse to go to an adjacent room through any open door with equal probability.

- Construct the transition matrix \mathbf{W} for both floor plans.
- The one-way doors are incompatible with the detailed-balance condition. Show that the transition matrix is regular, nevertheless, in both cases. For what minimum exponent s does \mathbf{W}^s have no zero elements in each case?
- Regularity of \mathbf{W} guarantees that the probability distribution for the location of the mouse is unique after the bell has rung a great many times. Calculate that stationary distribution for both cases by solving the left-eigenvector problem of matrix \mathbf{W} .



Solution: