

*\*Social\*Networks\**

QUIZ #8

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Q1. [10 ] In Mathland, the weather is described either as *sunny* or *rainy* (nothing in between). On a sunny day there is an equal chance it will rain on the following day or be sunny. On a rainy day, however there is a 70% chance it will rain on the following day (versus a 30% chance it will be sunny).

Is Mathland, on the average, a rainy place or a sunny place?

SOLN.1 Model the weather as an ergodic Markov chain, with a regular transition matrix,  $A$ :

$$A = \begin{bmatrix} 0.7 & 0.3 \\ 0.5 & 0.5 \end{bmatrix}.$$

The solution is given by the stationary distribution  $\pi = (r, s)$ , such that  $\pi A = \pi$  (why?). That is,

$$0.7r + 0.5s = r$$

$$0.3r + 0.5s = s$$

and  $r = 0.625$ .