

1. Consider the Markov chain with the transition matrix

$$\begin{pmatrix} 0 & .1 & .9 & 0 \\ 0 & .2 & 0 & .8 \\ .6 & 0 & .3 & .1 \\ 0 & .5 & 0 & .5 \end{pmatrix}$$

Sketch the associated directed graph. Determine which states are transient/recurrent. Identify irreducible classes.

2. A college has online classes, which may be followed either on cell phones or on computers. A student who logs in on a cell phone on a particular day switches to using a computer on the following day with probability .6. On the other hand, students using their computers switch to their cell phones on the next day with probability .3. Assume that on the first day of classes one half of the students log in with their cell phones, and the other half of them log in with their computers.
- (a) Determine the percentage of students using cell phones (i) on the second and (ii) on the third day of classes.
- (b) Consider the previous problem, and assume that the semester is very long. Determine the percentage of students using cell phones (computers) at the end of the semester.

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