BSM Course on Markov Chains and Dynamical Systems, Fall 2025

Quiz #2, October 2; **NAME:**

1. Consider the Markov chain with transition matrix

$$\begin{pmatrix} .1 & 0 & .9 & 0 \\ .2 & .4 & 0 & .4 \\ .7 & 0 & .3 & 0 \\ 0 & .5 & 0 & .5 \end{pmatrix}$$

   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 .4 (and thus keeps on using her/his cell phone with probability .6). On the other hand students using their computers switch to their cell phones on the next day with probability .1 (and thus keep on using computers with probability .9). Assume that the semester is very long. Determine the percentage of students using cell phones (computers) by the end of the semester.