OUR RELATIONSHIP ENTERED ITS DECLINE AT THIS POINT.

THAT’S WHEN YOU STARTED GRAPHING EVERYTHING.

COINCIDENCE!

http://xkcd.com/523/
iClicker question #1

Which of the following matrices is a valid stochastic matrix that takes one state vector to another in a Markov chain?

A: $$\begin{bmatrix} 0.2 & 0.1 & 0.3 & 0.5 \\ 0.8 & 0.9 & 0.7 & 0.5 \end{bmatrix}$$  
B: $$\begin{bmatrix} 0.6 & 0.05 \\ 0.4 & 0.95 \end{bmatrix}$$  
C: $$\begin{bmatrix} 1.6 & -0.2 \\ -0.6 & 1.2 \end{bmatrix}$$  
D: $$\begin{bmatrix} 0.4 & 0.2 \\ 0.3 & 0.5 \end{bmatrix}$$

Answer: B - A does not work because stochastic matrices must be square, C does not work because all the entries in a stochastic matrix must be non-zero, and D does not work because the columns of a stochastic matrix must add up to 1. B satisfies all these properties and is thus a valid stochastic matrix.
iClicker question #2

Which of the following stochastic matrices represents a regular Markov chain?

A: \[
\begin{bmatrix}
0.5 & 1 \\
0.5 & 0
\end{bmatrix}
\]  
B: \[
\begin{bmatrix}
1 & 0.3 \\
0 & 0.7
\end{bmatrix}
\]  
C: \[
\begin{bmatrix}
0.6 & 0 \\
0.4 & 1
\end{bmatrix}
\]

Answer: A - If you take powers of these matrices, the only one who’s square has only non-zero positive entries in it is A. You can also look for 1’s on the diagonal (or zeros on the diagonal of the matrix minus the identity matrix) as indications of absorbing states and thus non-regular stochastic matrices. Note that not all non-regular matrices need to have ones on the diagonal, eg. the transpose of the identity matrix.