CS 103: Networks
Homework 6

Dan Sheldon

December 2, 2015

Instructions

- Due Tuesday, 12/8 at *beginning* of class
- List all collaborators on your submission
- Review the course collaboration policy (collaboration encouraged; write own solutions).

Problems

Complete all of these:

1. Chapter 21, Exercise 1. **Note:** this question does not refer to any of the models in this chapter—just answer using common-sense understanding of how diseases can propagate over time. Assume that a node stays infected indefinitely once infected.

2. Chapter 21, Exercise 3. **Hint**: use the basic reproductive number to reason about this. Try first setting $x = 0$ and reasoning about the effectiveness of santization (y) by itself, then setting $y = 0$ and reasoning about the effictiveness of containment (x) by itself.

3. Suppose a new technology X is backward-compatiable with an old technology Y, so an individual who adopts X still receives some benefit from interacting with friends that use Y (and vice versa). Consider the following payoff matrix to model this situation of partial compatibility:

	X	Y
X	5,5	3,2
Y	2,3	4,4

   Suppose technology X is spreading through a network where individuals previously used technology Y. The payoff for each individual is determined by playing the coordination game above with each neighbor in the network. Does this coordination game also result in "threshold contagion"? In other words, let p be the fraction of node A's neighbors that adopt X. It there some threshold value q such that A should adopt X when p is at least q, and not adopt x is p is less than q? If so, determine the threshold value q. If not, explain your answer.

4. Chapter 19, Exercise 2