Feedback — Optional programming assignment 1

You submitted this homework on **Fri 16 Nov 2012 7:44 AM PST**. You got a score of **10.00** out of **10.00**.

The programming assignment this week is short to give you time to start on the project.

But for this week: take the ER diffusion model. This model is an SI model (nodes are either susceptible or infected). Make it an SIS model: nodes are susceptible, they become infected, and then they have a chance of recovering from the infection (at which point they are immediately susceptible again). At each time step, each infected node infects each of its uninfected neighbors with probability INFECT-RATE. After it does so, it has a probability RECOVER-RATE of recovering (and not infecting anyone in subsequent time steps). It may be simplest to answer this question if you do the following:

- Add a global variable RECOVER-RATE by adding a slider to the GUI
- Add a monitor variable (call it e.g. cumul-av), which records the cumulative average number of infected nodes over time.

Once done, your interface may look something like this.

NetLogo is likely unfamiliar to you. Browse its documentation. You may find the built-in models library a great source of example code.

In answering the following questions, run the model repeatedly (setting up a new network topology, then reinfecting a few times, each time giving the virus a chance to infect a non-trivial fraction of the network). Once you have the virus wreaking havoc in the network, answer the following:

Question 1

Set INFECT-RATE to 0.15, and RECOVER-RATE to 0.40. The NUM-NODES should be 200. Repeatedly construct the network and reinfect it until you get a significant infection. Let x be the average number of nodes infected in the long run (after a large initial infection) when AVG-DEGREE = 5. Let y be the same av. # nodes infected in the long run when AVG-DEGREE = 4. Give the ratio x/y (as a decimal).

Your answer should be accurate to within 0.1. Please use only one decimal place as including more seems to trip up the grader.

You entered:

1.35

Your Answer		Score	Explanation
1.35	✓	5.00	
Total		5.00 / 5.00	

Question Explanation

When the average degree is higher, a higher proportion of the network will be infected at any given time. At AVG-DEGREE = 5, the avg. number of nodes infected is ~ 92. At AVG-DEGREE = 4, the avg. number of nodes infected is ~ 68, giving a ratio of

Question 2

Keeping the settings the same, again get an infection bouncing around your network. What is the highest value of AVG-DEGREE from this list where the infection can die out after having infected a significant portion of the network?

Your Answer		Score	Explanation
◉ 3.4	✓	5.00	
Total		5.00 / 5.00	

Question Explanation

If you vary AVG-DEGREE, you'll notice that right around 3.4 to 3.5, the infection can be sustained for long periods of time, but then dies out. Any higher than that, and it can persist in the network indefinitely.