CS1100 Introduction to Computer Science and its Applications
Fall 2009
Lab E2

Part 1

Two roommates Chris and Dave move into an apartment. Each brings 1000 CDs. Since they both have such extensive music collections they decide not to buy, steal or borrow any additional CDs from the outside world, but they each lend CDs back and forth between them.
After a time they notice that at the end of any week, 30% of the CDs in Chris' room have migrated to Dave's room, and 15% of the CDs in Dave's room have migrated to Chris' room. It is never the case that a fraction of a CD moves from room to room.

Questions:

1. Will all the CDs end up in one room?
2. Will the number of CDs in each room continue to change each week?
3. If the number of CDs in each room reaches a constant level, how many weeks does it take for this to happen?
4. How many CDs end up in Dave's room?
5. How many CDs end up in Chris's room?
6. Suppose we change the percentages to 25% and 16%. Does the number of weeks to achieve steady state change?
7. What is it?

Build a spreadsheet to solve this problem.

1) Columns A and B should contain the parameters of the problem as well as the answers to the questions asked. Column A should contain labels for the cells in column B. The answers to the questions can be hard coded text. Label the answers to the questions "Question 1, Question 2, etc."
2) Leave Column C blank, for aesthetic reasons
3) In the columns beginning with column D, have your spreadsheet model the process of CDs going from room to room each week. You may use as many columns as you need to model the process.
4) Remember that only whole CDs move, nothing like 1/3 of a CD should move. If it looks like a fraction of a CD needs to move to satisfy the conditions of the problem, round the number of CDs to the nearest whole CD. So instead of 23.45 CDs we get 23, and instead of 23.69 CDs we get 24.
5) You need to change the parameters of the problem to complete questions 6 and 7. You may leave the parameters in that state when you submit your assignment.

Part 2

Suppose that each of these fellows destroys a certain percent of the CDs in his room in a given week, and once a CD is destroyed it is no longer part of the process. We might imagine that Chris has a cat that eats CDs, and David has a CD player that eats CDs.

Suppose in any given week Chris destroys 5 % of the CDs in his room and David destroys 8%. On sheet 2 copy your solution from sheet 1 and then modify it to account for this additional complication. Answer the following questions? You may use hardcoded text for your answers.

1. Will the number of CDs in each room continue to change each week?
2. If the number of CDs in each room reaches a constant level, how many weeks does it take for this to happen?
3. How many CDs end up in Dave's room?
4. How many CDs end up in Chris's room?