

CSU101 Introduction to Computer Science and its Applications
Spring 2008
Lab 2

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. Assuming this continues, what will happen?
2. Will all the CDs end up in one room?
3. If not, is there a steady state, so many in one room and so many in the other?
4. If so, how many CDs end up in each room?
5. How many weeks does it take to reach steady state?
6. Suppose we change the percentages to 25% and 18%. Does the number of weeks to achieve steady state change?
7. What is it?

Build a spreadsheet to solve this problem.

- 1) Make sure that you isolate the parameters of the problem to their own cells and label them.
- 2) Have your spreadsheet model the process of CDs going from room to room each week.
- 3) 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.
- 4) Answer all of the **questions** above in a vertical series of labeled cells, with labels "Question 1", "Question 2", etc.. Start the labels at A50.
- 5) Plot the number of CDs each week in each room so we have a graphical portrait of the process.
- 6) Make sure your name is in the spreadsheet, and that it is called *yourlastnameLab2.xls*. Submit this spreadsheet on Blackboard in the usual way.

Extra Credit

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 3.5 % of the CDs in his room and David destroys 1.78%. On sheet 2 copy your solution from sheet 1 and then modify it to account for this additional complication. How does this effect the outcome of the process?

Late assignments incur a grade penalty of 20% within the 24 hours, after which assignments will not be accepted.