Math 110-02, 27 January 2014   **Name:**

Question 1. Here are a few more questions related to the pigeonhole principle.

a) Can we be sure that there are two people living on Earth now who were born at exactly the
same second? Assume that time of birth can be determined to within a second (although it's
not really true).

b) Is it likely that there are two people who have the same number of cells in their bodies? You
might have to do some googling!

c) How likely do you think it is that the following number has ever been written down before
this: 299,792,458

d) How about this number: 37,334,212,090,129,453,889,723,826,017,441

Question 2. Here is a problem from the textbook. *Order the following numbers from smallest to largest: number of telephones on the planet, number of honest members of Congress, number of people, number of grains of sand, number of states in the United States, number of cars.* Come up with an ordering, and explain your reasoning—but then you can also criticize the problem if you want.

Question 3. Continue work on the four-coin problem (four coins including one counterfeit that can be light or heavy; use the balance twice to find the counterfeit). Draw a diagram. We showed that the first move has to be to compare one coin to one other coin. (A good way to get a check-plus would be to work on the problem when you have a fifth coin available that you know is real; in that case, it's possible to find the counterfeit and say whether it's light or heavy.)