MATH 113: DISCRETE STRUCTURES
HOMEWORK 14

Due: Monday, March 2 at 10pm.

Problem 1. There are 10 people in a room of ages somewhere between 1- and 60-years old (inclusive).

(a) Use the pigeonhole principle to show there must be two distinct nonempty groups of people in the room such that the sum of each group's ages is the same.
(b) Prove there must be two *disjoint* nonempty groups of people in the room such that the sum of each group's ages is the same. [Hint: From the first part of this problem, you know there exist two distinct groups A and B whose age sums are equal. Start there.]

Problem 2. All of the integers 1 through 10 are placed in chairs around a circular table with 10 seats. Prove that there must be one set of three neighboring numbers whose sum is at least 17. [Hint: There are ten sets of three neighboring numbers as you go around the table. What number do you get if you add up these ten sets?]