

MATH 113: DISCRETE STRUCTURES
HOMEWORK DUE MONDAY WEEK 6

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

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