MATHEMATICS 220—DISCRETE MATHEMATICS—OCTOBER 24, 2006

ASSIGNMENT 6

DUE WEDNESDAY, OCTOBER 29.

Reading. Biggs, Sections 6.1–6.7.

Problems.

(1) There are 51 houses on a street. Each has a house number between 1000 and 1099, inclusive. Show that at least two houses have addresses that are consecutive integers.

(2) Biggs, problem 6.7.5.

(Note that a full answer to this question has two parts. After you figure out what the "magic number"—let's call it n_0 for now—is, you'll need to give a proof that n_0 points suffice. But, you also need to demonstrate that, with only $n_0 - 1$ points, it's possible to arrange the points so that no pair is close enough together.)

(3) Biggs, problem 6.5.2.

(4) Let X be a subset of the set of natural numbers. Prove that X is finite if and only if it has a greatest element.

(5) Show that the set of all finite subsets of $\mathbb{N}$ is countable.