

March 12, 2008

### Problem 10.3

Let  $S$  be a subset of  $\{1, 2, \dots, 3n\}$  having size  $2n + 1$ . Prove that  $S$  must contain 3 consecutive numbers. Show that this is the best possible by exhibiting a set of size  $2n$  for which the conclusion is false.

### Midpoints between integer points

Given 5 integer points in the plane, show that the midpoint of the segment joining some pair of them is also an integer point (an **integer point** is one with integer coordinates).