Problem sheet 7

Problems will be discussed at the problem class on **December 14, 2016**.

Problem 14.
Consider 50 apples and 50 pears being packed in 50 boxes in some way. For example, there may be empty boxes, boxes containing 2 apples and 42 pears, etc.

a) Prove that one can always pick at most 26 boxes such that these boxes contain in total at least 25 apples and 25 pears.

b) How do you have to pack the apples and pears into the boxes so that picking 25 boxes is not enough?

c) What about 50 apples, 50 pears and 50 coconuts in 50 boxes?

Problem 15.
Show that for every set X of n points in the plane there exist a point $p \in \mathbb{R}^2$ and two perpendicular lines through p such that each of the four quadrants at p contains at least $\lfloor n/4 \rfloor$ points of X.

Puzzle 7.
Consider the given set of 12 points with exactly six 4-big lines. How many 4-big lines can you create by moving only four points (where it is not allowed to place points on top of each other)?