Problem sheet 5

Problems will be discussed at the problem class on **November 30, 2016**.

Problem 10.
Determine the Helly number of family $C$ and property $P$ in each of the following cases:

- $C$ is the family of arcs on a unit circle and $P$ is “have a non-empty intersection”.
- $C$ is the family of all vertical segments in the plane $\mathbb{R}^2$ and $P$ is “can be pierced by some straight line”.
- $C$ is the family of all closed convex sets in $\mathbb{R}^2$ and $P$ is “the union fits between two parallel lines at distance 1”.

Problem 11.
Show that if $X \subseteq \mathbb{R}^2$ is a compact convex set and $p \in X$ is any point, then there exists a segment $s(p)$ such that

- $p$ is contained in $s(p)$ and $s(p)$ is contained in $X$,
- there are two parallel tangents of $X$, each containing one endpoint of $s(p)$.

Puzzle 5.
How many sliding moves are needed to bring the L-shape in the bottom-right corner?