1. Prove using extremal graph theoretic methods (and not the crossing lemma) that there are at most
   a) $O(n^{3/2})$ incidences (sum of the number of points for each line) between $n$ points and $n$ lines,
   b) $mn^{1/2} + n$ incidences between $n$ points and $m$ lines. (By duality, also $m^{1/2}n + m$.)

2. Prove using the crossing lemma that between $n$ points and $m$ lines in the plane, the number of incidences
   is at most $O(n^{2/3}m^{2/3} + n + m)$. (This is known as the Szemerédi-Trotter theorem.)

3. Prove that between $n$ points and $n$ circles in the plane, the number of tangencies is at most $O(n^{3/2})$.

4. (HW) Show that if we have $n$ points in the plane, then there are at most $O(n^2/k^3 + n/k)$ lines that
   contain at least $k$ points.

5. * Prove that there is a $K$ such that if we have $n$ points in the plane, then either there is a line containing
   at least $n/K$ points, or there are at least $n^2/K$ lines containing at least two points.

New exercises and notes can be found at http://dcg.epfl.ch/page85509.html
Solutions to selected homeworks should be handed in at the beginning of the next session or sent to doemoetoer.palvoelgyi@epfl.ch.