
— M436 — Homework Assignment 1 —

Due: Friday, September 5, in class.

Each problem is worth 20 points. Please show all your work.

Exercise 1

Consider the three four points $p_1 = (5, 8)$, $p_2 = (-1, -1)$, $q_1 = (-2, -1)$ and $q_2 = (3, 4)$. Determine the coordinates of the intersection of the line p_1p_2 with the line q_1q_2 .

Exercise 2

Consider the following four points:

$$p_1 = (2, 3) \quad p_2 = (3, 4) \quad p_3 = (4, 5) \quad p_4 = (5, 6)$$

and determine which of the points p_i is incident with any of the six lines p_jp_k for $j \neq k$

Exercise 3

Consider the three points $p_1 = (1, 0)$, $p_2 = (2, 0)$, $p_3 = (3, 0)$ and the three points $q_1 = (0, 1)$, $q_2 = (0, 3)$, $q_3 = (0, 5)$. Denote the intersection of the line p_iq_j with the line p_jq_i by r_{ij} . Show that the three points r_{12} , r_{13} , r_{23} are collinear.

Exercise 4

Consider the three points $p_1 = (3, 1)$, $p_2 = (5, 3)$, $p_3 = (2, 5)$, and the three points $q_1 = (-5, 5)$, $q_2 = (-3, 1)$, $q_3 = (-1, -4)$.

1. Show the the three lines p_1q_1 , p_2q_2 and p_3q_3 are concurrent, and determine their common intersection.
2. Compute the intersection r_{ij} of the lines p_ip_j and q_iq_j for $i \neq j$.
3. Show that the three points r_{12} , $r_{1,3}$, r_{23} are collinear.

Exercise 5

Show that the midpoints of the edges of a quadrilateral in the plane are the vertices of a parallelogram. Is this still true if the quadrilateral lies in space?