

Inversion-II.

It is required to solve 3 problems to pass the task.

Problem 1. Construct with compass only the circle passing through the given 3 points.

Problem 2 (Mohr–Mascheroni theorem). Any line in this problem is given by its two points. Construct with a compass only *a*) the one or two points in the intersection of a line and a circle (if they intersect); *b*) the point which is the intersection of two existing, non-parallel lines. *c*) Prove that any geometric construction that can be performed by a compass and ruler can be performed by a compass alone.

Problem 3. Prove that central projection of the sphere to itself takes circles to circles.

Hint: Consider central projection as the inversion of \mathbb{R}^3 with respect to certain sphere.

Problem 4 (Problem of Apollonius). Construct with a ruler and compass circles that are tangent to three given circles in a plane.

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