

Extra credit problems

Math 471

0. Find a mistake or misprint in the book. (The score depends on the type of mistake.)
1. Show that a composition of three reflections in the sides of a nondegenerate triangle does not have a fixed point.
2. Given distinct points A , B and X make a ruler-and-compass construction of another point $Y \in (AX)$ such that $AY + BY = AX + BX$ and explain why it works. (You may play with the GeoGebra applet [apfzzybw](#).)
3. Let m be an indirect motion of the plane. Show that the midpoints of all line segments $[X m(X)]$ lie on one line.
4. Let us denote by ρ_ℓ the reflection across line ℓ . Let ℓ and m be lines on the plane and n is the reflection of ℓ across m . Show that $\rho_m \circ \rho_\ell = \rho_n \circ \rho_m$.
5. Lines ℓ and m are tangent to two circles of radiuses r and R on such a way the circles are on one side of ℓ and on different sides of m . Let A and B be tangential points of ℓ and Q be the point of intersection ℓ and m . Show that $QA \cdot QB = R \cdot r$.
6. Given a line segment with marked midpoint, perform a ruler-only construction a line through a given point parallel to the the segment. Explain why it works. (You may play with the GeoGebra applet [qrmffpkv](#).)