

MAT 515: Geometry for Teachers
Problem Set 9

Stony Brook University
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Fall 2019

Problem 1. (3+3 points)

- (a) Prove that the midpoints of the sides of a rectangle are vertices of a rhombus.
- (b) Prove that the midpoints of the sides of a rhombus are vertices of a rectangle.

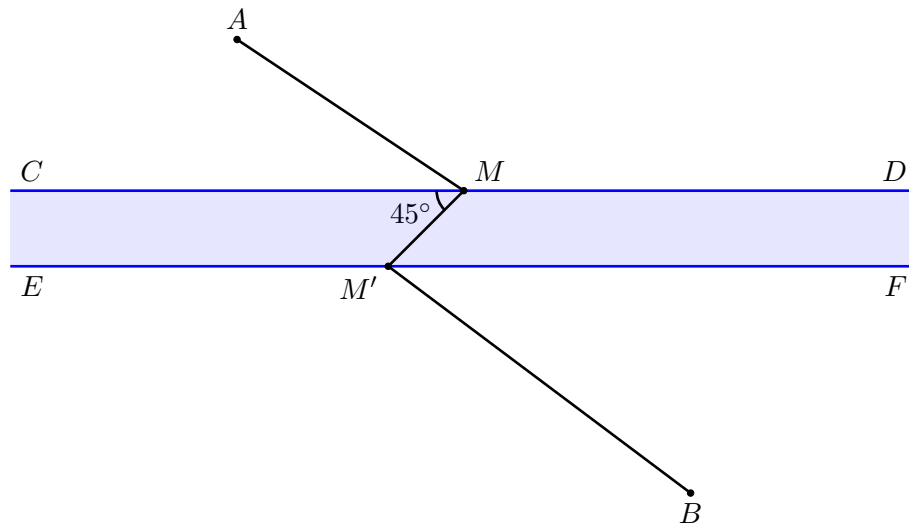
Problem 2. (6 points)

Let $ABCD$ be a trapezoid where $BC < AD$ are its bases (i.e., BC and AD are parallel sides). Denote by M and N the midpoints of the diagonals AC and BD . Prove that MN is congruent to $\frac{1}{2}(AD - BC)$.

Hint: consider $\triangle ABD$, $\triangle ABC$ and use the midline theorem.

Problem 3. (6 points)

Two towns A and B are situated on opposite sides of a river whose banks CD and EF are parallel straight lines. At which point should one build a slant bridge MM' across the river, where M is on the line CD , such that $\angle CMM' = 45^\circ$ and such that $AM + MM' + M'B$ is the shortest possible path between A and B ? Describe how to construct M or M' and explain your answer.



Hint: compare with the “classical bridge problem” discussed on October 21 (page 78 in the book).

Due Date: Wednesday November 6.