Problem 6 (due Monday, April 22)

Let $ABCD$ be a convex quadrilateral whose diagonals AC and BD intersect at a point P. Let M,N be the midpoints of the sides AB and CD respectively. Prove that the area of the triangle PMN is equal to the quarter of the absolute value of the difference between the area of the triangle DAP and the area of the triangle BCP: \[\text{area}(\triangle MNP)=\frac{1}{4}\left|\text{area}(\triangle DAP)-\text{area}(\triangle BCP)\right |.\]

We received only one solution, from Sasha Aksenchuk. Sasha's solution uses analytic geometry and is similar to one of our in-house solutions. For a complete solution see the following link Solution.