

 **Problem 1.** A convex quadrilateral $ABCD$ satisfies

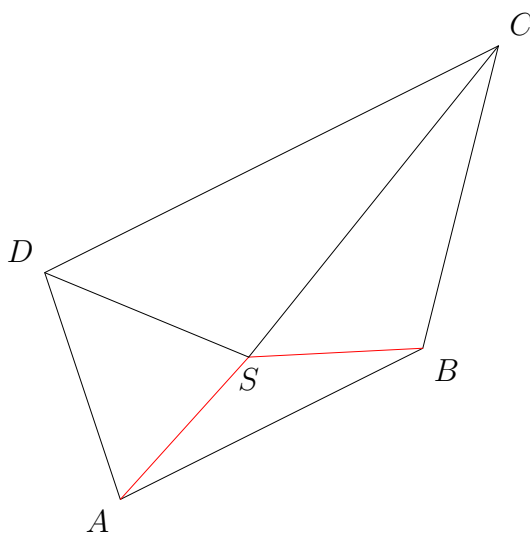
$$|AD| + |BC| = |CD|.$$

The bisectors of angles $\angle BCD$ and $\angle CDA$ intersect at point S . Prove that $|AS| = |BS|$.

Problem source: 8th Junior Mathematical Olympiad — First Round — Correspondence part

Problem selection and solution editing: Maja Chlewicka

Solution: Let E be a point on side CD such that $|AD| = |DE|$ and $|EC| = |CB|$. It follows that triangles $\triangle ADS$ and $\triangle DES$ are congruent (by the SAS criterion), hence $|ES| = |AS|$. Similarly, triangles $\triangle ESC$ and $\triangle CSB$ are congruent, so $|ES| = |SB|$. Therefore, $|AS| = |SB|$, which completes the proof.



Problem 2. On a board, the numbers $1, 2, 3, \dots, 2025$ are written. Every minute we choose two distinct numbers a and b , erase them, and write the number $a+b-1$ instead. This process continues until only one number remains. What number will remain at the end?

Problem author: Antonina Pajek

Solution: Initially, the sum of all numbers is

$$S_0 = 1 + 2 + \dots + 2025 = \frac{2026 \cdot 2025}{2}.$$

Let us check how the sum changes after one operation. If we choose a and b and replace them by $a+b-1$, then the new sum equals

$$S' = S - a - b + (a + b - 1) = S - 1.$$

Thus, with each operation, the sum decreases by 1. Since we start with 2025 numbers and end with 1, we perform 2024 such operations. Therefore, the final sum is

$$S_k = S_0 - 2024,$$

that is,

$$S_k = \frac{2026 \cdot 2025}{2} - 2024 = 2049301.$$