Math 461 Worksheet 1. Monday 9/16/19.

Name:

Instructions:

- There are two problems, each with two parts. Scratch paper is available.
- Justify your answers carefully. Complete proofs are expected (as in MATH 300).
- No phones or other electronic devices. No textbooks allowed (but you may consult your class notes if you wish).

Q1. A *quadrilateral* is a 4-sided polygon. A *parallelogram* is a quadrilateral such that the opposite sides are parallel.

(a) Prove that the opposite sides of a parallelogram $ABCD$ have equal lengths, that is, $|AB| = |CD|$ and $|BC| = |DA|$.

(b) Prove that the diagonals AC and BD of a parallelogram $ABCD$ bisect each other. That is, writing E for the intersection point of AC and BD, we have $|AE| = |EC|$ and $|BE| = |ED|$.

Q2. A *rhombus* is a quadrilateral $ABCD$ such that all the sides have equal lengths, that is, $|AB| = |BC| = |CD| = |DA|$.

(a) Prove that a rhombus is a parallelogram.

(b) Prove that the diagonals AC and BD of a rhombus $ABCD$ intersect at right angles.