Math 340: Geometry

Homework 4

1. Exercises 3.3.2, 3.3.3, 3.3.4, and 3.3.5. Note that the exercises have some typos in the textbook. Here are the corrections: In 3.3.2, one of the lines should read:

$$|OP| = x_1, \quad |PQ| = \sqrt{(x_2 - x_1)^2 + y_2^2}, \quad |OQ| = \sqrt{x_2^2 + y_2^2}.$$

   In 3.3.3 the equation should read:

$$(|OP| + |PQ|)^2 - |OQ|^2 = 2x_1 \left(\sqrt{(x_2 - x_1)^2 + y_2^2} - (x_2 - x_1) \right).$$

2. Exercise 4.3.1.
3. Exercises 4.3.2, 4.3.3, 4.3.4, and 4.3.5.
4. Exercises 4.4.3 and 4.4.4. The equation in 4.4.4 should read as

$$\left(\mathbf{w} - \frac{\mathbf{u} + \mathbf{v}}{2} \right) \cdot (\mathbf{u} - \mathbf{v}) = 0$$

5. Exercises 4.5.2 and 4.5.3.
6. Exercises 4.6.2, 4.6.3, and 4.6.4.
7. Let P be a point inside square $ABCD$ such that $PA = 2$, $PB = 3$, $PC = 4$. Compute PD.
8. Let $ABCD$ be a rhombus with a point P on the side BC and Q on the side CD such that $BP = CQ$. Prove that the centroid of the triangle APQ lies on the segment BD.

BONUS Let $\triangle ABC$ be an equilateral triangle. Suppose P is a point inside the triangle satisfying that $AP = 3, BP = 4$, and $CP = 5$. Find the length of the side of equilateral triangle, i.e., find AB.