Assignment #4
Crossing Diagonals
*Due on Friday, 10 February.**

In what follows, suppose that $ABCD$ is a parallelogram, with $AB \parallel CD$ and $AD \parallel BC$. You may also assume that $|AB| = |CD|$ and $|AD| = |BC|$.

1. Suppose that the diagonals AC and BD of the parallelogram intersect at E. Show that E is the midpoint of each diagonal. *[5]*

2. Suppose that the diagonals AC and BD of the parallelogram intersect at E, and the diagonals are perpendicular to each other. Show that $ABCD$ is actually a rhombus, *i.e.* that $|AB| = |CD| = |AD| = |BC|$. *[5]*