Reflection Groups - Assignment 2
Due on January 26, 2016

1. Prove that a finite group of orthogonal transformations of $\mathbb{R}^2$ is either a cyclic group or the dihedral group D_{2n}.

2. Let Φ be a root system in a euclidean space V and $U \subset V$ be a vector subspace of V. Prove that $\Phi \cap U$ is a (possibly empty) root system in U.

3. Describe planar root systems with 4 roots and the corresponding reflection groups.

4. Prove that D_{2n} has one conjugacy class of reflections if n is odd and two conjugacy classes of reflections if n is even.

5. Prove that in a root system in $\mathbb{R}^2$, the lengths of roots can take at most two values.