Homework 12 MAT 515

Solve problems 1, 2, 3, 4, and 5.

- (1) Prove that a dilation preserves collinearity and angles.
- (2) If $\triangle ABC$ and $\triangle DEF$ are two triangles such that $\angle CAB \cong \angle FDE$ and AB/AC = DE/DF then $\triangle ABC$ and $\triangle DEF$ are similar.
- (3) If S is a similarity with ratio s and R is a similarity with ratio r then $S \circ R$ is a similarity with ratio r.s and S^{-1} is a similarity with ratio 1/s
- (4) Consider an isometry T. Determine the type of T (rotation, reflection or glide reflection) in each of the following cases:
 - (a) T has no fixed points.
 - (b) T has exactly one fixed point.
 - (c) The set of fixed points of T is a line.
- (5) If two triangles $\triangle ABC$ and $\triangle DEF$ are similar, then there exist a positive real number r, such that |AB| = r|DE|, |BC| = r|EF| and |AC| = r|DF|.
- (6) Determine all isometries ofinite order, that is, all isometries T such that $T^n = id$ positive integer n. You may use the fact that translations, reflections, rotations and glide reflections are the only isometries of the plane.