## Homework 12 MAT 515

Solve problems $1,2,3,4$, and 5 .
(1) Prove that a dilation preserves collinearity and angles.
(2) If $\triangle A B C$ and $\triangle D E F$ are two triangles such that $\angle C A B \cong \angle F D E$ and $A B / A C=$ $D E / D F$ then $\triangle A B C$ and $\triangle D E F$ are similar.
(3) If $S$ is a similarity with ration $s$ 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 $\triangle A B C$ and $\triangle D E F$ are similar, then there exist a positive real number $r$, such that $|A B|=r|D E|,|B C|=r|E F|$ and $|A C|=r|D F|$.
(6) Determine all isometries ofinite order, that is, all isometries $T$ such that $T^{n}=i d$ positive integer n . You may use the fact that translations, reflections, rotations and glide reflections are the only isometries of the plane.

