RIGID MOTIONS OF THE PLANE

LECTURE 1, EXERCISE SET 1

**Definition 1.** A *rigid motion* of the plane (or an *isometry*) is a motion which preserves distance.

There are four basic rigid motions:

1. Reflection
2. Glide Reflection
3. Rotation
4. Translation

**Theorem 2.** The above list contains all rigid motions of the plane.

**Exercise 3.** Describe compositions of the following motions as one of the motions from the list above.

1. Rotation by $\alpha$ (radians) counter clockwise around the origin followed by rotation by $\beta$ (radians) counter clockwise around the origin.
2. Translation by a vector $(a, b)$ followed by translation by a vector $(c, d)$.
3. Reflection through a line $l_1$ followed by reflection through a line $l_2$.
4. Translation by $(1, 1)$ followed by rotation by $90^\circ$ ($=\frac{\pi}{2}$) counter clockwise around the origin.
5. Rotation by $90^\circ$ counter clockwise around the origin followed by translation by $(1, 1)$.
6. Rotation by $90^\circ$ counter clockwise around the origin followed by rotation by $90^\circ$ clockwise around the point with coordinates $(2, 0)$.

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