

## QUESTIONS ABOUT SYMMETRY

1. What kind of symmetries are there?
2. What exactly do we mean by a symmetry anyway?
3. Does the set of symmetries of an object always form a group?
4. What kinds of groups can be the set of symmetries for some object? Is there some object out there whose set of symmetries is (isomorphic to)  $GL(2, \mathbb{R})$ ? Or  $A_5$ ?

Show that an isometry  $T : \mathbb{R}^n \longrightarrow \mathbb{R}^n$  is one-to-one.

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Let  $F$  be a set of points in  $\mathbb{R}^n$ . Let  $S =$  the set of all isometries of  $\mathbb{R}^n$  that carry  $F$  onto itself. Show that  $S$  is a group under function composition.

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