

MAT 150A, Fall 2019  
Homework Assignment 7

**Due before the start of the class on Wednesday, December 4**

**Written Assignment:** Page 223, exercises 5.2, 5.5, Problems A and B.

**Problem A:** a) A brick has height 1, width 2 and length 3. How many isometries does it have? Present each isometry by an orthogonal  $3 \times 3$  matrix, assuming that the center of the brick has coordinates  $(0, 0, 0)$  and the sides are parallel to the coordinate axis.

- b) Find the orbit and stabilizer of this action for each face of the brick.
- c) Find the orbit and stabilizer of this action for each vertex of the brick.
- d) Find the orbit and stabilizer of this action for each edge of the brick.

**Problem B:** Consider the action of the group  $S_7$  on the set of 3-element subsets of  $\{1, 2, 3, 4, 5, 6, 7\}$ .

- a) Find the stabilizer of the subset  $\{1, 2, 3\}$ .
- b) Describe the orbit of  $\{1, 2, 3\}$  and use Counting Formula to compute the size of this orbit.

*The homework must be legible, and written in connected sentences that explains what you are doing. Just the answer (whether correct or not) is not enough. Please put your name and section number on every page and staple the pages together. Homework should be handed in on time, late homework will not be graded.*