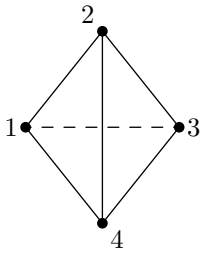
Math 3103 Combinatorics (Luecking) NAME:_____
(Please print clearly)

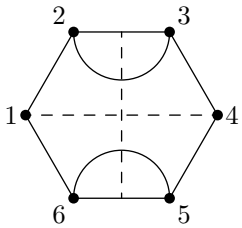
Thirteenth Quiz (solutions) Due April 22, 2024

For each of the figures below, **determine the group of rigid motions**. You must express all elements of the group as permutations of the vertex labels, written in **disjoint cycle notation**. (Our version of this notation requires all vetex labels to be present in each permutation. Thus, if the labels are 1 through 4, (13) is never correct but (13)(2)(4) might be.)

1. 

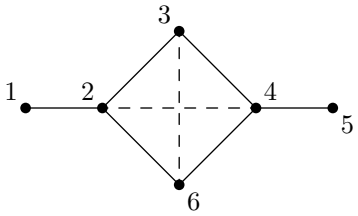
A rhombus (all sides equal) with a line connecting 2 opposite vertices.

Ans: (a) (i) Identity, 180 rotation, left-right reflection, top-bottom reflection:
$\{(1)(2)(3)(4), (13)(24), (13)(2)(4), (1)(24)(3)\}$

2. 

Regular hexagon with 2 symmetrically placed semicircles.

Ans: Identity, 180 rotation, left-right reflection, top-bottom reflection:
$\{(1)(2)(3)(4)(5)(6), (14)(25)(36), (14)(23)(56), (1)(26)(35)(4)\}$

3. 

Square with 2 identical symmetrically placed line segments.

Ans: Identity, 180 rotation, left-right reflection, top-bottom reflection:
$\{(1)(2)(3)(4)(5)(6), (15)(24)(36), (15)(24)(3)(6), (1)(2)(36)(4)(5)\}$