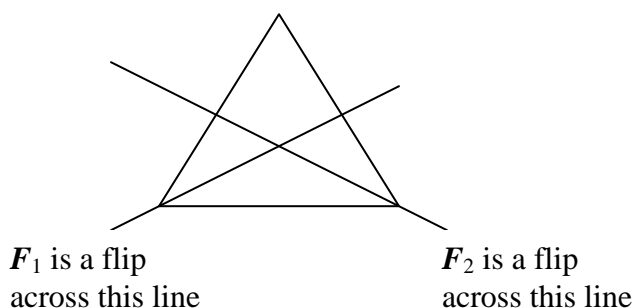


Math 344 – Fall 08
Section 001 - Caughman
Homework #1
Due Thursday 10 – 9

1. In class, we figured out how to express all of the six symmetries of an equilateral triangle in terms of F (a flip across a vertical axis) and R (a 120-degree clockwise rotation). Is it possible to express all of the six symmetries in terms of the two flips, F_1 and F_2 , shown in the figure below?

If so, make a chart similar to the one we made in class expressing the symmetries in terms of the symbols F_1 and F_2 .

If not, provide a justification for why it cannot be done.



Assume the triangle is actually equilateral and the lines shown are actual lines of symmetry!

2. Half of the symmetries of an equilateral triangle are *flips*, and the other half are *rotations*.
- Is the combination of two *flips* always, sometimes, or never a *flip*? Justify your response.
 - Is the combination of two *rotations* always, sometimes, or never a *rotation*? Justify your response.
 - Is the combination of a *rotation* and a *flip* always, sometimes, or never a *rotation*? Justify your response.

3. Consider the pair of functions f and g given by:

$$f(x) = \frac{1}{x} \text{ for all } x \in \mathfrak{R} \setminus \{0,1\} \quad \text{and} \quad g(x) = \frac{1}{1-x} \text{ for all } x \in \mathfrak{R} \setminus \{0,1\}$$

- How many total functions can be generated by composing combinations of any number of these two functions? Justify your assertion.
- Make a table that gives the result of composing any two of the functions that you generated to answer part a.
- List at least 5 interesting properties/rules/relationships that you discovered while working on part a and b.