Group Theory Quiz 1
 I am not going to snap over this quiz!!!

 Analysis 23/24
 Period

 Hahn / Hlasek / Tantod
 30
 No calculator. You can use a flip triangle for this quiz.

 1. Below are some of the elements of the 12-post snap group. Write the period of each.

[2 pts each]



- 2. Draw an element of the 12-post snap group with period 60 or state that there is no such element. [2 pts]
- 3. What is the **maximum** period of an element in the 27-post snap group? Show how you got your answer. [3 pts]
- Each element of D₃ can be generated using only elements F and R defined in the table below. Represent each of the remaining three elements of D₃ using as few operations as possible. Some elements will require you to use both F and R, others can be represented using only one of them. [3 pts]



5. Group **H** is defined by the group table below.

	Ρ	Q	R	S	Т	U	a) What is the identity? [1 pt]
Р	Ρ	Q	R	S	Т	U	b) What is the order of H ? [1 pt]
Q	Q	R	S	Т	U	Ρ	
R	R	S	Т	U	Р	Q	c) What is the inverse of T? [1 pt]
S	S	Т	U	Ρ	Q	R	d) What is the period of S? [2 pts]
Т	Т	U	Ρ	Q	R	S	e) What is the period of U? [2 pts]
U	U	Ρ	Q	R	S	Т	

f) Is group M isomorphic to the three-post snap group? Justify your answer. [2 pts]

- 6. Is the set of numbers {0, i, -i} a group under addition? If yes, state which element is the identity. If not, justify using the requirements for a group. [2 pts]
- Consider the rotation group for regular pentagon where the element shown below is the identity element.

Let **R** be the operation **"rotate 72° clockwise"**. Let **Q** be the operation **"rotate 144° counterclockwise"**.

a) Draw the element represented by RQR. [2 pts]





- b) What is the order of the group generated by **R** and **Q**? Justify your answer. [1 pt]
- c) What is the order of the group generated by **Q** alone? [1 pt]
- 8. Consider group G = {all real numbers that are not equal to -1} under binary operation ⊗ defined as a ⊗ b = a + b + ab.
 - a) What is the identity in this group? [1 pt]
 - b) Find the inverse of 3. Show your work. [2 pts]