

MTH 361
Quiz 3
Spring 2010

20 points possible.

1. (4 pts.) Take-home problem.
2. (4 pts.) Let G be a group and let $w \in G$. Define the **cyclic subgroup of G generated by w** .
3. (4 pts.) Describe all the elements in the cyclic subgroup of $GL(2, \mathbb{R})$ generated by the given 2×2 matrix.

$$\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$$

4. (4 pts.) Let F be the set of all real-valued functions with domain \mathbb{R} and let \tilde{F} be the subset of F consisting of those functions that have a nonzero value at every point of \mathbb{R} . You may use the facts that F is a group under function addition and that \tilde{F} is a group under function multiplication.

Let H be the set of all $f \in \tilde{F}$ such that $f(3) = 1$.

(a) Using function addition as the operation, is H a subgroup of F ? Support your answer very briefly.

(b) Using function multiplication as the operation, is H a subgroup of \tilde{F} ? Support your answer very briefly.

5. (4 pts.) Compute the products in S_3 .

(a) $\begin{pmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \end{pmatrix} \begin{pmatrix} 1 & 2 & 3 \\ 1 & 3 & 2 \end{pmatrix}$

(b) $\begin{pmatrix} 1 & 2 & 3 \\ 2 & 1 & 3 \end{pmatrix} \begin{pmatrix} 1 & 2 & 3 \\ 3 & 1 & 2 \end{pmatrix}$