

MATH 403 FALL 2021: HOMEWORK 10

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Note: The problems 2, 3, 5, 8, 10 will only be graded.

1. Let α be an isometry and ℓ be a line. Show that $\sigma_{\alpha(\ell)} = \alpha\sigma_{\ell}\alpha^{-1}$.
2. Exercise 4.2
3. Exercise 4.5: Let α be an isometry. Suppose that $\alpha\sigma_{\ell} = \sigma_{\ell}\alpha$ holds for any line ℓ . Show that α is the identity map.
4. Exercise 4.7: Let ℓ_1, ℓ_2 be lines with $\ell_1 \perp \ell_2$. Show that $\sigma_{\ell_1}\sigma_{\ell_2} = \sigma_C$ for some $C \in \mathbb{R}^2$.
5. Exercise 4.9
6. Exercise 4.10
7. Exercise 4.11
8. Exercise 4.12
9. Exercise 4.13
10. Let α be a rotation with center $C \in \mathbb{R}^2$ through the oriented angle $\theta \in (-\pi, \pi]$ and ℓ be a line. Suppose α is not the identity map and $\alpha(\ell) = \ell$. Show that α is the central reflection in C .