

HW #8 Homomorphisms

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Name _____

In Exercises 1-9, determine whether or not the given function defines a homomorphism. If ϕ IS an isomorphism, identify $\ker(\phi)$.

1. $\phi : (\mathbb{Z}, +) \rightarrow (\mathbb{R}, +)$, given by $\phi(n) = n$
2. $\phi : (\mathbb{Z}, +) \rightarrow (\mathbb{Z}, +)$, given by $\phi(n) = -n$
3. $\phi : (\mathbb{R} \setminus \{0\}, \cdot) \rightarrow (\mathbb{R} \setminus \{0\}, \cdot)$, given by $\phi(x) = |x|$
4. $\phi : (\mathbb{R} \setminus \{0\}, \cdot) \rightarrow (\mathbb{R} \setminus \{0\}, \cdot)$, given by $\phi(x) = \frac{1}{x}$
5. $\phi : (\mathbb{Z}_6, +) \rightarrow (\mathbb{Z}_2, +)$, given by $\phi(n) = n \bmod 2$
6. $\phi : (\mathbb{Z}_9, +) \rightarrow (\mathbb{Z}_2, +)$, given by $\phi(n) = n \bmod 2$
7. $\phi : (\mathbb{R}, +) \rightarrow (\mathbb{R} \times \mathbb{R}, +)$, given by $\phi(x) = (x, 0)$
8. $\phi : (\mathbb{Z}_5, +) \rightarrow (\mathbb{Z}_{25}, +)$, given by $\phi(x) = x \bmod 25$
9. $\phi : (\mathbb{Z}_5, +) \rightarrow (\mathbb{Z}_{27}, +)$, given by $\phi(x) = x \bmod 27$