Math 331: Homework 11, Due Dec 2

1. Prove or disprove: The group of units in $\mathbb{Z}_7$ (with multiplication) is isomorphic to $(\mathbb{Z}_6, +)$.
2. Suppose G is cyclic of order n and H is cyclic of order n. Prove that G is isomorphic to H.
3. Find a non-trivial homomorphism from $\mathbb{Z}_3 \to \mathbb{Z}_6$.
4. Find a non-trivial homomorphism from $\mathbb{Z}_6 \to \mathbb{Z}_3$.
5. Find a non-trivial homomorphism from $\mathbb{Z}_6 \to \mathbb{Z}_4$.
6. Find a non-trivial homomorphism from $\mathbb{Z}_6 \to \mathbb{Z}_5$.
7. Find all the generators of $\mathbb{Z}_8$, $\mathbb{Z}_{12}$ and $\mathbb{Z}_7$.
8. Find all the generators of the group of units of $\mathbb{Z}_7$.
9. Is the group of units of $\mathbb{Z}_{20}$ a cyclic group? If so, find a generator. If not, prove that it is not cyclic.
10. Find all elements in $\mathbb{Z}_{60}$ that have order 5.
11. Find an isomorphism from $(\mathbb{R}^+, \cdot)$ to $(\mathbb{R}, +)$.
    Hint, we did something similar in class.