Do the following exercises from Judson:
Chapter 11, Section 11.3: 7, 13

Exercises not from the text:

1. Let $T = \{z \in \mathbb{C}^* \mid |z| = 1\}$. Prove that $\mathbb{C}^*/T$ is isomorphic to $\mathbb{R}^+$, the group of positive real numbers under multiplication.

2. Suppose that $G$ is a finite group and that $\phi : G \to \mathbb{Z}_{10}$ is an onto group homomorphism. What can we say about the order of $G$? Generalize this statement.

3. If $H$ and $K$ are normal subgroups of a group $G$ and $H \cap K = \{e\}$, prove that $G$ is isomorphic to a subgroup of $G/H \times G/K$.

4. Let $N$ be a normal subgroup of a finite group $G$. Prove that the order of the group element $gN$ in $G/N$ divides the order of $g$.