Reading Questions 18

page 96: Definition 4.24,4.26,4.27

1. A relation of a set is a set.
2. An equivalence relation of a set is a function.
3. Consider the relation $\{\{1,2\},\{2,1\},\{1,3\}\}$ on the set $\{1,2,3\}$. What element is missing from the relation that would make the relation symmetric?

Section 4.4 Orbits (Part 1)

Equivalence Relations

P 1. Prove or disprove: Let $a \sim b$ if $a, b \in \mathbb{Z}$ and $a \leq b$. Then $\sim$ is an equivalence relation on $\mathbb{Z}$.

P 2. Let $a \sim b$ if $a, b \in \mathbb{Z}$ and $a \leq b$. Find cl(2).

Orbits

P 3. Let $G = S_7$. Let $H =< (23), (132) >$ act on $\Omega = [7]$ where $h \cdot a = h(a)$ for $h \in H$ and $a \in \Omega$. What are the orbits of Ω?

P 4. Let $\mathrm{GL}(n, \mathbb{R})$ act on $\mathrm{M}_{n\times n}(\mathbb{R})$ where $P \cdot A = PAP^{-1}$ for $P \in \mathrm{GL}(n, \mathbb{R})$ and $A \in \mathrm{M}_{n\times n}(\mathbb{R})$. What are the orbits of A?

P 5. Let $\mathrm{GL}(n, \mathbb{R})$ act on $\mathrm{M}_{n\times n}(\mathbb{R})$ where $P \cdot A = PA$ for $P \in \mathrm{GL}(n, \mathbb{R})$ and $A \in \mathrm{M}_{n\times n}(\mathbb{R})$. What are the orbits of A?