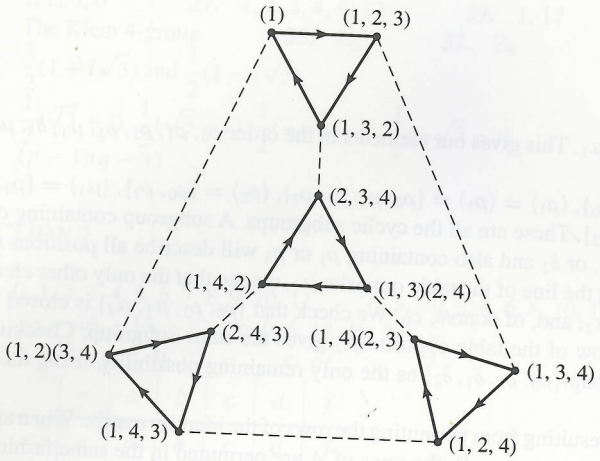
19.



23. **a.** *F* **c.** *F* **e.** *F* **g.** *T* **i.** *T*

SECTION 10

1. $4\mathbb{Z} = \{\cdots, -8, -4, 0, 4, 8, \cdots\}$
$1 + 4\mathbb{Z} = \{\cdots, -7, -3, 1, 5, 9, \cdots\}$
$2 + 4\mathbb{Z} = \{\cdots, -6, -2, 2, 6, 10, \cdots\}$
$3 + 4\mathbb{Z} = \{\cdots, -5, -1, 3, 7, 11, \cdots\}$

3. $\langle 2 \rangle = \{0, 2, 4, 6, 8, 10\}$, $1 + \langle 2 \rangle = \{1, 3, 5, 7, 9, 11\}$

5. $\langle 18 \rangle = \{0, 18\}$, $1 + \langle 18 \rangle = \{1, 19\}$, $2 + \langle 18 \rangle = \{2, 20\}, \cdots, 17 + \langle 18 \rangle = \{17, 35\}$

7. $\{\rho_0, \mu_2\}, \{\rho_1, \delta_1\}, \{\rho_2, \mu_1\}, \{\rho_3, \delta_2\}$. Not the same.

9. $\{\rho_0, \rho_2\}, \{\rho_1, \rho_3\}, \{\mu_1, \mu_2\}, \{\delta_1, \delta_2\}$

11. Yes, we get a coset group isomorphic to the Klein 4-group V.

	ρ_0	ρ_2	ρ_1	ρ_3	μ_1	μ_2	δ_1	δ_2
ρ_0	ρ_0	ρ_2	ρ_1	ρ_3	μ_1	μ_2	δ_1	δ_2
ρ_2	ρ_2	ρ_0	ρ_3	ρ_1	μ_2	μ_1	δ_2	δ_1
ρ_1	ρ_1	ρ_3	ρ_2	ρ_0	δ_1	δ_2	μ_2	μ_1
ρ_3	ρ_3	ρ_1	ρ_0	ρ_2	δ_2	δ_1	μ_1	μ_2
μ_1	μ_1	μ_2	δ_2	δ_1	ρ_0	ρ_2	ρ_3	ρ_1
μ_2	μ_2	μ_1	δ_1	δ_2	ρ_2	ρ_0	ρ_1	ρ_3
δ_1	δ_1	δ_2	μ_1	μ_2	ρ_1	ρ_3	ρ_0	ρ_2
δ_2	δ_2	δ_1	μ_2	μ_1	ρ_3	ρ_1	ρ_2	ρ_0

13. 3 **15.** 24

19. **a.** *T* **c.** *T* **e.** *T* **g.** *T* **i.** *F*

21. $G = \mathbb{Z}_2$, subgroup $H = \mathbb{Z}_2$.

23. Impossible. The number of cells must divide the order of the group, and 12 does not divide 6.