

MTH 4441 Test #2

FALL 2022

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Name _____

1. Define - Cyclic group

2. Define - Direct Product of Groups $(G, *G)$ and $(H *H)$

3. **Prove or Disprove:** $(\mathbb{R}, +)$ is a cyclic group

4. **Prove or Disprove:** $(\mathbb{Q}, +)$ is a cyclic group

5. Compute the sum of the elements $(5, 2)$ and $(4, 2)$ in the group $\mathbb{Z}_6 \times \mathbb{Z}_3$

6. Given the group table for $(G, *)$, find all of the subgroups of $(G, *)$ and justify your answers. Draw a subgroup diagram for $(G, *)$.

$*$	e	a	b	c	d
e	e	a	b	c	d
a	a	b	c	d	e
b	b	c	d	e	a
c	c	d	e	a	b
d	d	e	a	b	c

7. Construct the group table for (\mathbb{Z}_6, \oplus) , and then find all of the subgroups of (\mathbb{Z}_6, \oplus) and justify your answers. Draw a subgroup diagram for (\mathbb{Z}_6, \oplus) .
8. Calculate the order of the element $(4, 9)$ in the group $\mathbb{Z}_{18} \times \mathbb{Z}_{12}$
9. Calculate the order of the element $(8, 6, 4)$ in the group $\mathbb{Z}_{18} \times \mathbb{Z}_9 \times \mathbb{Z}_8$
10. Construct the group table for (U_7, \odot) , and then find all of the subgroups of (U_7, \odot) and justify your answers. Draw a subgroup diagram for (U_7, \odot) . (Recall: $U_7 = \{1, 2, 3, 4, 5, 6\}$)

11.