

Introduction to mathematical cryptography
Homework problems
Week 3

5. Assume G is a group, and H_1, H_2 are subgroups of G . Prove that if $H_1 \cup H_2$ is also a subgroup of G , then $H_1 \leq H_2$ or $H_2 \leq H_1$ (or equivalently, if $H_1 \not\leq H_2$ and $H_2 \not\leq H_1$, then $H_1 \cup H_2$ is not a subgroup of G).

[Hint](#)

6. Give all the numbers $1 \leq c \leq 9999$ which satisfy $c \equiv 12 \pmod{99}$ and $c \equiv 22 \pmod{101}$.

[Hint](#)

Note: Please provide complete arguments everywhere.