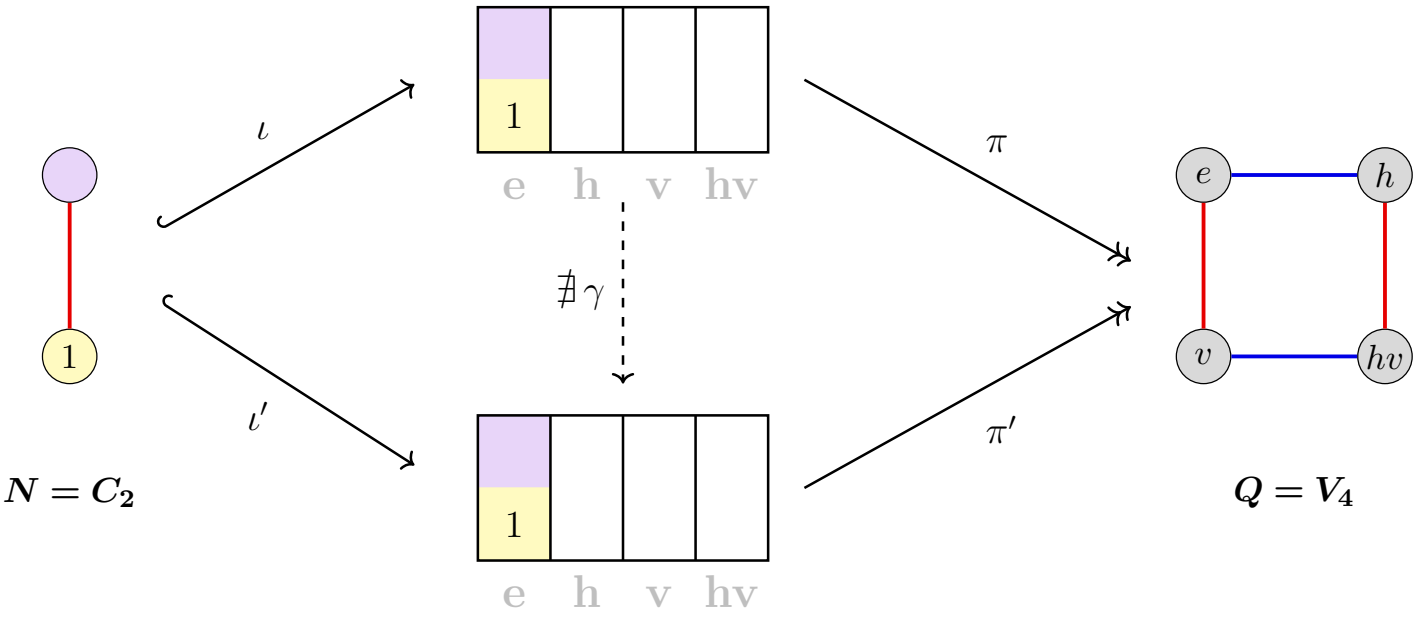
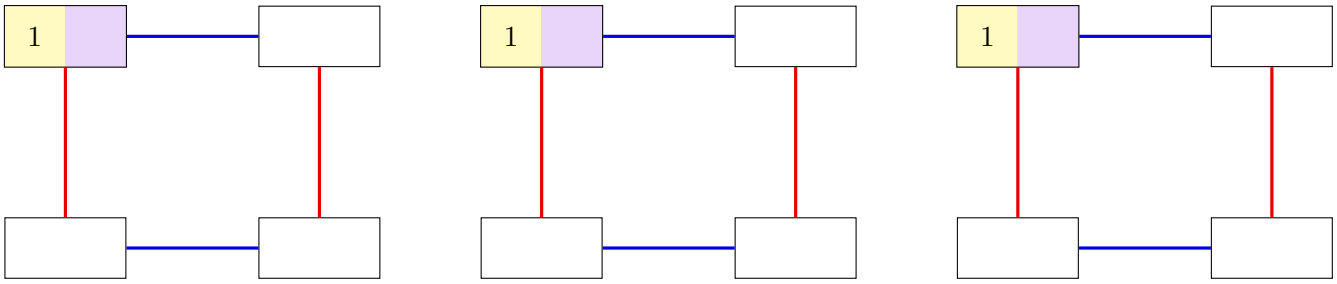
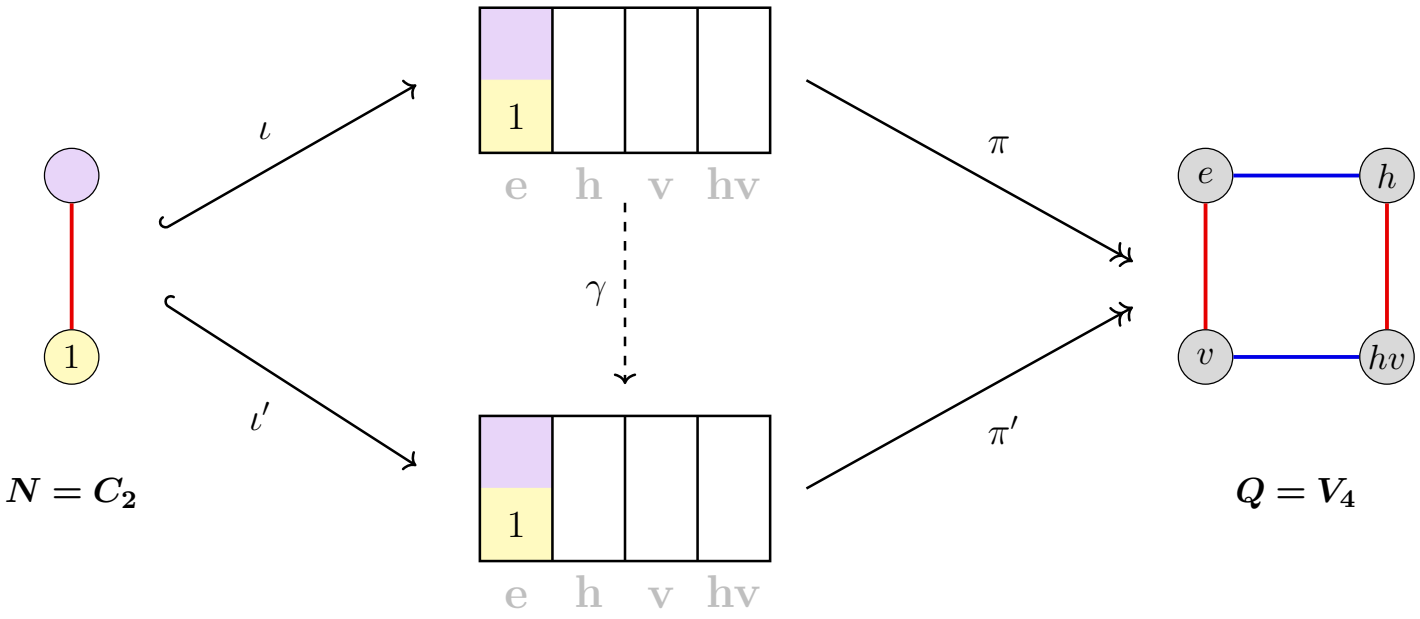
Supplemental material for Math 4130, HW 5

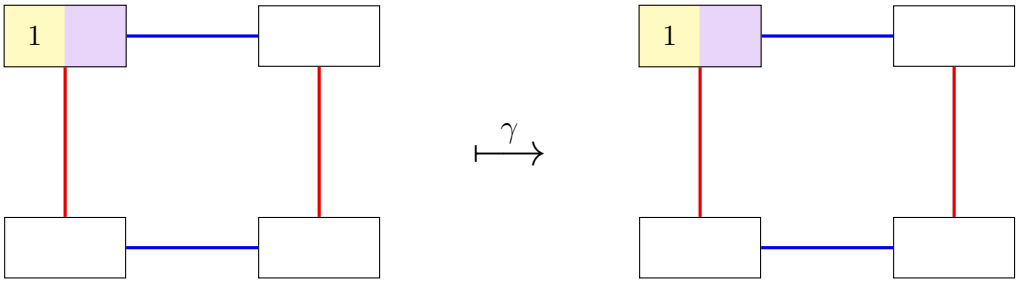
#1(b): Three non-equivalent extensions $C_2 \hookrightarrow G \twoheadrightarrow V_4$.





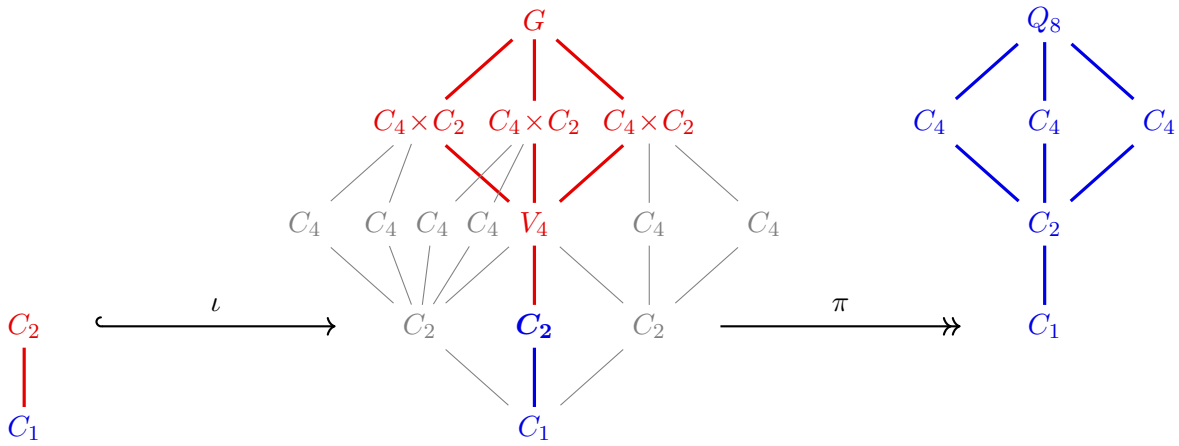
#1(b): All extensions $C_2 \hookrightarrow G \twoheadrightarrow V_4$ are equivalent, because they differ by some $\gamma \in \mathrm{Aut}(G)$. An example of two are shown below.



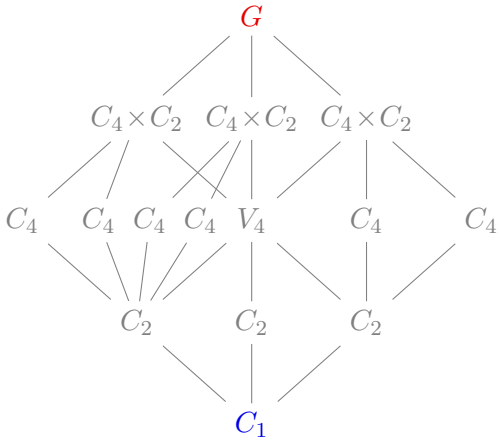


#3: Six non-trivial extensions $N \hookrightarrow G \twoheadrightarrow Q$ of a group of order 16, that are different up to isomorphisms.

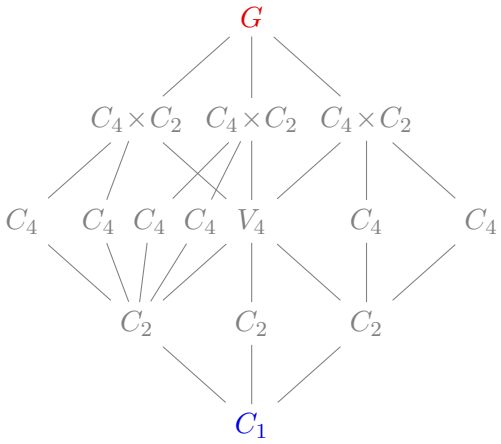
1. $G = Q_8.C_2$ is a nonabelian, nonsplit extension of Q_8 by C_2.



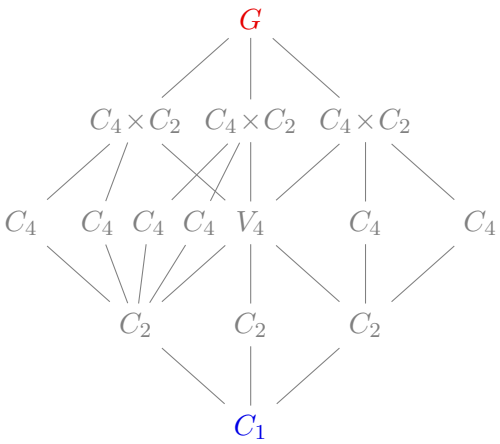
2.



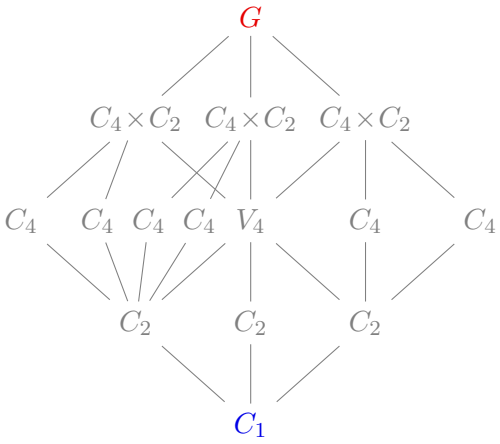
3.



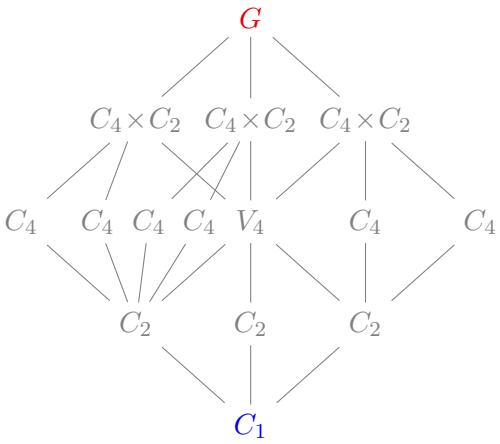
4.


G
$C_4 \times C_2$ $C_4 \times C_2$ $C_4 \times C_2$
C_4 C_4 C_4 C_4 V_4 C_4 C_4
C_2 C_2 C_2
C_1

5.


G
$C_4 \times C_2$ $C_4 \times C_2$ $C_4 \times C_2$
C_4 C_4 C_4 C_4 V_4 C_4 C_4
C_2 C_2 C_2
C_1

6.


G
$C_4 \times C_2$ $C_4 \times C_2$ $C_4 \times C_2$
C_4 C_4 C_4 C_4 V_4 C_4 C_4
C_2 C_2 C_2
C_1