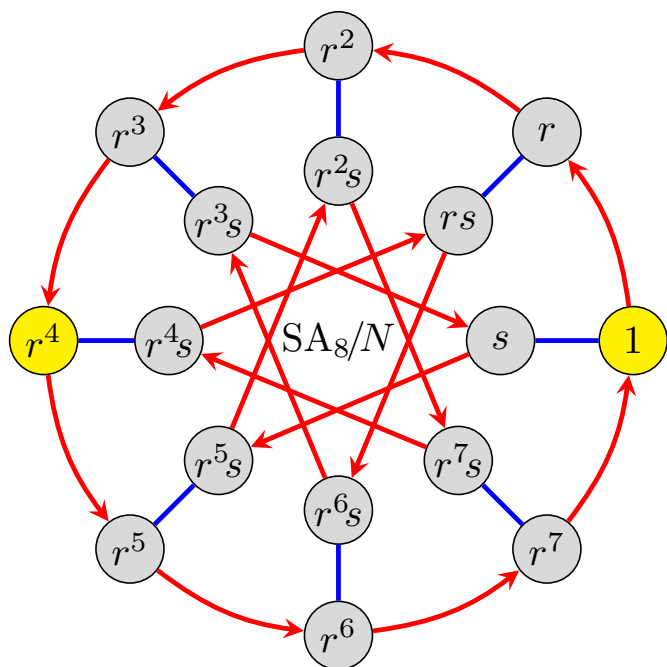
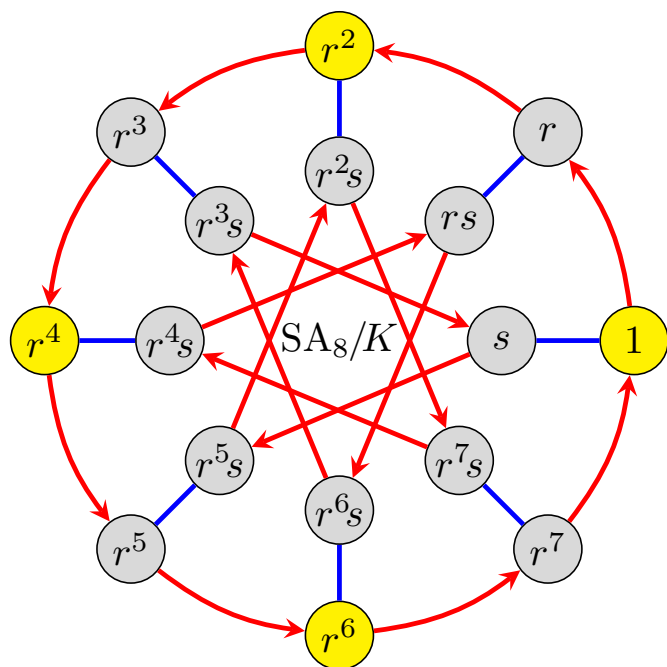
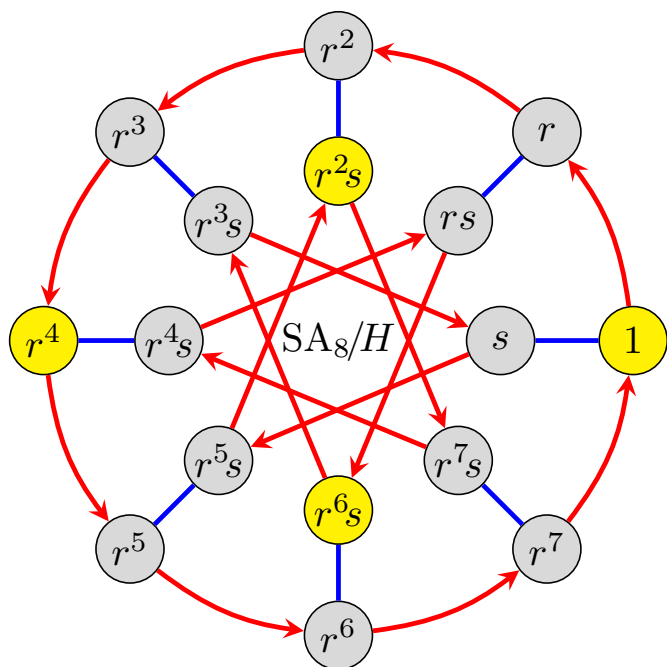
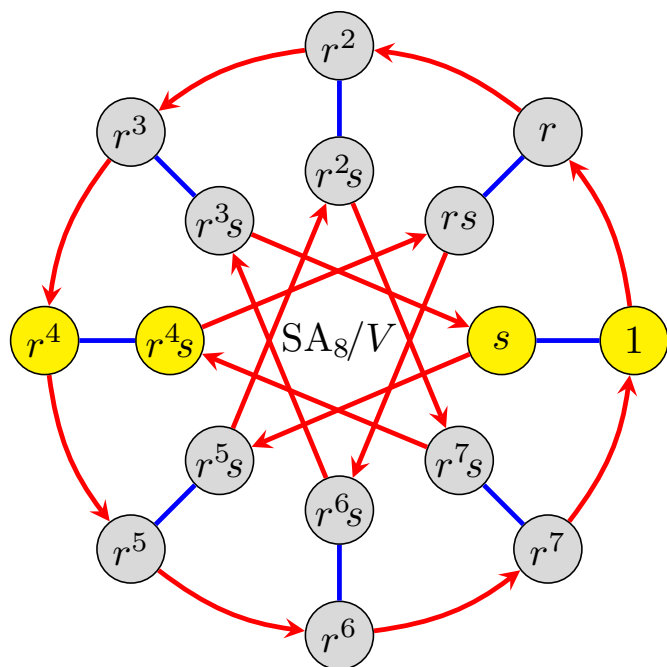


Supplemental material: Visual Algebra (Math 4120), HW 8

#1(a): Partitions of the *semiabelian group* SA_8 by cosets of the subgroups $V = \langle r^4, s \rangle$, $H = \langle r^2 s \rangle$, $K = \langle r^2 \rangle$, and $N = \langle r^4 \rangle$.



#1(b): Cayley tables of the quotients of SA_8 by its order-4 subgroups $V = \langle r^4, s \rangle$, $H = \langle r^2 s \rangle$, and $K = \langle r^2 \rangle$.

K	K
K	

#1(b): The Cayley table of the quotient of SA_8 by its order-2 subgroup $N = \langle r^4 \rangle$.

	N	rN	r^2N	r^3N	sN	rsN	r^2sN	r^3sN
N								
rN								
r^2N								
r^3N								
sN								
rsN								
r^2sN								
r^3sN								

#1(c): Shoebox diagrams of the nontrivial proper subgroups of SA_8/N , other than $\langle N \rangle \cong \{e\}$, $\langle rN, sN \rangle \cong \text{SA}_8/N$, and $\langle rN \rangle \cong C_4$ (already done).

r^3N	r^3sN
r^2N	r^2sN
rN	rsN
N	sN

r^3	r^7	r^3s	r^7s
r^2	r^6	r^2s	r^6s
r	r^5	rs	r^5s
1	r^4	s	r^4s

r^3	r^7	r^3s	r^7s
r^2	r^6	r^2s	r^6s
r	r^5	rs	r^5s
1	r^4	s	r^4s

r^3N	r^3sN
r^2N	r^2sN
rN	rsN
N	sN

r^3	r^7	r^3s	r^7s
r^2	r^6	r^2s	r^6s
r	r^5	rs	r^5s
1	r^4	s	r^4s

r^3	r^7	r^3s	r^7s
r^2	r^6	r^2s	r^6s
r	r^5	rs	r^5s
1	r^4	s	r^4s

r^3N	r^3sN
r^2N	r^2sN
rN	rsN
N	sN

r^3	r^7	r^3s	r^7s
r^2	r^6	r^2s	r^6s
r	r^5	rs	r^5s
1	r^4	s	r^4s

r^3	r^7	r^3s	r^7s
r^2	r^6	r^2s	r^6s
r	r^5	rs	r^5s
1	r^4	s	r^4s

r^3N	r^3sN
r^2N	r^2sN
rN	rsN
N	sN

r^3	r^7	r^3s	r^7s
r^2	r^6	r^2s	r^6s
r	r^5	rs	r^5s
1	r^4	s	r^4s

r^3	r^7	r^3s	r^7s
r^2	r^6	r^2s	r^6s
r	r^5	rs	r^5s
1	r^4	s	r^4s

r^3N	r^3sN
r^2N	r^2sN
rN	rsN
N	sN

r^3	r^7	r^3s	r^7s
r^2	r^6	r^2s	r^6s
r	r^5	rs	r^5s
1	r^4	s	r^4s

r^3	r^7	r^3s	r^7s
r^2	r^6	r^2s	r^6s
r	r^5	rs	r^5s
1	r^4	s	r^4s

#1(f): Shoebox diagrams of subgroups of SA_8/V , where $V = \langle r^4, s \rangle$.

r^3V
r^2V
rV
V

r^3	r^7	r^3s	r^7s
r^2	r^6	r^2s	r^6s
r	r^5	rs	r^5s
1	r^4	s	r^4s

r^3	r^7	r^3s	r^7s
r^2	r^6	r^2s	r^6s
r	r^5	rs	r^5s
1	r^4	s	r^4s

r^3V
r^2V
rV
V

r^3	r^7	r^3s	r^7s
r^2	r^6	r^2s	r^6s
r	r^5	rs	r^5s
1	r^4	s	r^4s

r^3	r^7	r^3s	r^7s
r^2	r^6	r^2s	r^6s
r	r^5	rs	r^5s
1	r^4	s	r^4s

r^3V
r^2V
rV
V

r^3	r^7	r^3s	r^7s
r^2	r^6	r^2s	r^6s
r	r^5	rs	r^5s
1	r^4	s	r^4s

r^3	r^7	r^3s	r^7s
r^2	r^6	r^2s	r^6s
r	r^5	rs	r^5s
1	r^4	s	r^4s

#1(f): Shoebox diagrams of subgroups of SA_8/H , where $H = \langle r^2s \rangle$.

r^3H
r^2H
rH
H

r^3	r^5s	r^7	rs
r^2	r^4s	r^6	s
r	r^3s	r^5	r^7s
1	r^2s	r^4	r^6s

r^3	r^5s	r^7	rs
r^2	r^4s	r^6	s
r	r^3s	r^5	r^7s
1	r^2s	r^4	r^6s

r^3H
r^2H
rH
H

r^3	r^5s	r^7	rs
r^2	r^4s	r^6	s
r	r^3s	r^5	r^7s
1	r^2s	r^4	r^6s

r^3	r^5s	r^7	rs
r^2	r^4s	r^6	s
r	r^3s	r^5	r^7s
1	r^2s	r^4	r^6s

r^3H
r^2H
rH
H

r^3	r^5s	r^7	rs
r^2	r^4s	r^6	s
r	r^3s	r^5	r^7s
1	r^2s	r^4	r^6s

r^3	r^5s	r^7	rs
r^2	r^4s	r^6	s
r	r^3s	r^5	r^7s
1	r^2s	r^4	r^6s

#1(f): Shoebox diagrams of subgroups of SA_8/K , where $K = \langle r^2 \rangle$.

rsK
sK
rK
K

rs	r^3s	r^5s	r^7s
s	r^2s	r^4s	r^6s
r	r^3	r^5	r^7
1	r^2	r^4	r^6

rs	r^3s	r^5s	r^7s
s	r^2s	r^4s	r^6s
r	r^3	r^5	r^7
1	r^2	r^4	r^6

rsK
sK
rK
K

rs	r^3s	r^5s	r^7s
s	r^2s	r^4s	r^6s
r	r^3	r^5	r^7
1	r^2	r^4	r^6

rs	r^3s	r^5s	r^7s
s	r^2s	r^4s	r^6s
r	r^3	r^5	r^7
1	r^2	r^4	r^6

rsK
sK
rK
K

rs	r^3s	r^5s	r^7s
s	r^2s	r^4s	r^6s
r	r^3	r^5	r^7
1	r^2	r^4	r^6

rs	r^3s	r^5s	r^7s
s	r^2s	r^4s	r^6s
r	r^3	r^5	r^7
1	r^2	r^4	r^6

rsK
sK
rK
K

rs	r^3s	r^5s	r^7s
s	r^2s	r^4s	r^6s
r	r^3	r^5	r^7
1	r^2	r^4	r^6

rs	r^3s	r^5s	r^7s
s	r^2s	r^4s	r^6s
r	r^3	r^5	r^7
1	r^2	r^4	r^6

rsK
sK
rK
K

rs	r^3s	r^5s	r^7s
s	r^2s	r^4s	r^6s
r	r^3	r^5	r^7
1	r^2	r^4	r^6

rs	r^3s	r^5s	r^7s
s	r^2s	r^4s	r^6s
r	r^3	r^5	r^7
1	r^2	r^4	r^6