

i	a_i	b_i	q_i	r_i
1	289	247	1	52
2	247	52	4	39
3	52	39	1	13
4	39	13	3	0
5	13	0	/	/

\swarrow (red arrow from 289 to 247)
 \swarrow (red arrow from 247 to 52)
 \swarrow (blue arrow from 52 to 39)
 \swarrow (blue arrow from 39 to 13)
 \swarrow (blue arrow from 13 to 0)

gg^T

i	a_i	b_i	q_i	r_i
1	578	442	1	136
2	442	136	3	34
3	136	34	4	0
4	34	0	/	/

$$gg^T(578, -442) = gg^T(578, 442)$$