A. Absolute Coalition Structure Values for Different ks

To determine which values of k are good candidates for the further investigation of our iterative algorithms, we also looked at the sums of the absolute coalition structure values that our algorithms found for different graph sizes n with different ks, as mentioned in Section 5.2. The tables in this appendix show these values (rounded to 6 decimal places) on the different solvers. The best values for each n are highlighted in bold.

A.1. QBSolv

k	n=4	n=6	n=8	n=10	n=12	n=14	n=16
2	**2.440467 ± 0.0**	5.646442 ± 0.0	5.646442 ± 0.0	13.811595 ± 0.0	16.292316 ± 0.0	**20.594957 ± 0.0**	20.113989 ± 0.0
3	**2.440467 ± 0.0**	**5.730368 ± 0.0**	**5.730368 ± 0.0**	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	20.164471 ± 0.0
4	**2.440467 ± 0.0**	**5.730368 ± 0.0**	**5.730368 ± 0.0**	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
5	-	**5.730368 ± 0.0**	**5.730368 ± 0.0**	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
6	-	**5.730368 ± 0.0**	**5.730368 ± 0.0**	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
7	-	-	**5.730368 ± 0.0**	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
8	-	-	**5.730368 ± 0.0**	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
9	-	-	-	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
10	-	-	-	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
11	-	-	-	-	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
12	-	-	-	-	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
13	-	-	-	-	-	**20.594957 ± 0.0**	**20.193669 ± 0.0**
14	-	-	-	-	-	**20.594957 ± 0.0**	**20.193669 ± 0.0**
15	-	-	-	-	-	-	**20.193669 ± 0.0**
16	-	-	-	-	-	-	**20.193669 ± 0.0**

k	n=18	n=20	n=22	n=24	n=26	n=28
2	16.090014 ± 0.0	24.304977 ± 0.0	27.311786 ± 0.003249	30.264435 ± 0.0	35.671803 ± 0.0	41.38372 ± 0.0
3	**16.132825 ± 0.0**	**24.378519 ± 0.0**	27.495913 ± 0.0	30.515788 ± 0.0	36.063207 ± 0.003885	41.559297 ± 0.007904
4	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.498707 ± 0.0**	**30.528199 ± 0.0**	**36.067317 ± 0.003731**	**41.565625 ± 0.011883**
5	**16.132825 ± 0.0**	24.377751 ± 0.001619	**27.498707 ± 0.0**	**30.528199 ± 0.0**	36.064598 ± 0.003525	41.562641 ± 0.015099
6	**16.132825 ± 0.0**	24.376599 ± 0.002024	27.498459 ± 0.000523	**30.528199 ± 0.0**	36.062293 ± 0.005025	41.54366 ± 0.037254
7	**16.132825 ± 0.0**	24.376599 ± 0.002024	**27.498707 ± 0.0**	**30.528199 ± 0.0**	36.059372 ± 0.007795	41.530647 ± 0.043598
8	**16.132825 ± 0.0**	24.377367 ± 0.001855	27.498459 ± 0.000523	**30.528199 ± 0.0**	36.056456 ± 0.011061	41.522415 ± 0.037308
9	**16.132825 ± 0.0**	24.376599 ± 0.002024	27.497881 ± 0.00235	30.527788 ± 0.001301	36.056384 ± 0.009155	41.52223 ± 0.042634
10	**16.132825 ± 0.0**	24.375749 ± 0.002116	27.497279 ± 0.003209	30.524949 ± 0.00536	36.056418 ± 0.00927	41.514449 ± 0.041215
11	**16.132825 ± 0.0**	24.373719 ± 0.004563	27.494548 ± 0.007744	30.525272 ± 0.007117	36.056464 ± 0.010814	41.498468 ± 0.050008
12	**16.132825 ± 0.0**	24.373936 ± 0.006063	27.491091 ± 0.009715	30.527596 ± 0.001908	36.055095 ± 0.006405	41.513725 ± 0.03854
13	**16.132825 ± 0.0**	24.374586 ± 0.00516	27.493622 ± 0.007521	30.526389 ± 0.002914	36.054323 ± 0.011025	41.508459 ± 0.047333
14	16.132806 ± 4e-05	24.372604 ± 0.005006	27.492195 ± 0.007541	30.524202 ± 0.009832	36.051755 ± 0.016299	41.507133 ± 0.035841
15	16.132786 ± 4.9e-05	24.374376 ± 0.004199	27.49096 ± 0.009297	30.523999 ± 0.006637	36.052775 ± 0.014818	41.501418 ± 0.048178
16	16.132806 ± 4e-05	24.37389 ± 0.00436	27.488346 ± 0.007759	30.521511 ± 0.011777	36.051664 ± 0.012476	41.46795 ± 0.063205
17	16.132806 ± 4e-05	24.37176 ± 0.00496	27.489084 ± 0.010721	30.522652 ± 0.010158	36.051155 ± 0.015798	41.469065 ± 0.057258
18	16.132806 ± 4e-05	24.372435 ± 0.004199	27.490174 ± 0.011674	30.520427 ± 0.010216	36.045201 ± 0.025835	41.512664 ± 0.03214
19	-	24.37062 ± 0.002607	27.490865 ± 0.010764	30.521954 ± 0.011312	36.036656 ± 0.024955	41.518186 ± 0.040604
20	-	24.371671 ± 0.004078	27.491208 ± 0.008622	30.517413 ± 0.012661	36.048385 ± 0.012948	41.511422 ± 0.039572
21	-	-	27.48392 ± 0.010727	30.526796 ± 0.004436	36.049937 ± 0.018246	41.514427 ± 0.036476
22	-	-	27.484456 ± 0.013125	**30.528199 ± 0.0**	36.048865 ± 0.017821	41.511941 ± 0.028905
23	-	-	-	**30.528199 ± 0.0**	36.047135 ± 0.018489	41.508425 ± 0.0389
24	-	-	-	**30.528199 ± 0.0**	36.045376 ± 0.017547	41.510149 ± 0.040537
25	-	-	-	-	36.04901 ± 0.025885	41.503464 ± 0.042294
26	-	-	-	-	36.039902 ± 0.017053	41.499609 ± 0.030826
27	-	-	-	-	-	41.501918 ± 0.045493

Table A.1.: Absolute coalition structure values and their standard deviations over different seeds, summed over same-sized graphs, found by the iterative Kochenberger algorithm using QBSolv, with respect to k.

k	n=4	n=6	n=8	n=10	n=12	n=14	n=16
2	**2.440467 ± 0.0**	5.722814 ± 0.0	5.722814 ± 0.0	13.869586 ± 0.0	**16.415579 ± 0.0**	**20.594957 ± 0.0**	20.113989 ± 0.0
3	**2.440467 ± 0.0**	**5.730368 ± 0.0**	**5.730368 ± 0.0**	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
4	**2.440467 ± 0.0**	**5.730368 ± 0.0**	**5.730368 ± 0.0**	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
5	-	**5.730368 ± 0.0**	**5.730368 ± 0.0**	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
6	-	**5.730368 ± 0.0**	**5.730368 ± 0.0**	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
7	-	-	**5.730368 ± 0.0**	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
8	-	-	**5.730368 ± 0.0**	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
9	-	-	-	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
10	-	-	-	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
11	-	-	-	-	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
12	-	-	-	-	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
13	-	-	-	-	-	**20.594957 ± 0.0**	20.193303 ± 0.001157
14	-	-	-	-	-	**20.594957 ± 0.0**	**20.193669 ± 0.0**
15	-	-	-	-	-	-	**20.193669 ± 0.0**
16	-	-	-	-	-	-	20.193303 ± 0.001157

k	n=18	n=20	n=22	n=24	n=26	n=28
2	16.117545 ± 0.0	24.295807 ± 0.0	27.259817 ± 0.007504	30.437186 ± 0.0	35.866295 ± 0.0	41.345697 ± 0.0
3	**16.132825 ± 0.0**	24.377693 ± 0.0	**27.498707 ± 0.0**	**30.528199 ± 0.0**	36.071274 ± 0.002374	**41.581374 ± 0.0**
4	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.498707 ± 0.0**	**30.528199 ± 0.0**	**36.072025 ± 0.0**	41.579741 ± 0.002887
5	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.498707 ± 0.0**	30.527849 ± 0.001109	**36.072025 ± 0.0**	41.579407 ± 0.003651
6	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.498707 ± 0.0**	30.527498 ± 0.001478	**36.072025 ± 0.0**	41.571853 ± 0.019937
7	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.498707 ± 0.0**	30.524338 ± 0.005516	36.071934 ± 0.000288	41.567543 ± 0.028218
8	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.498707 ± 0.0**	30.526797 ± 0.001811	36.071934 ± 0.000288	41.561719 ± 0.030491
9	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.498707 ± 0.0**	30.526797 ± 0.001811	36.070472 ± 0.003616	41.562212 ± 0.031364
10	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.498707 ± 0.0**	30.524338 ± 0.005516	**36.072025 ± 0.0**	41.543844 ± 0.03369
11	**16.132825 ± 0.0**	24.376834 ± 0.003552	**27.498707 ± 0.0**	30.523479 ± 0.006057	36.071215 ± 0.002561	41.564996 ± 0.029255
12	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.498707 ± 0.0**	30.523814 ± 0.009027	36.071228 ± 0.002328	41.567454 ± 0.030173
13	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.498707 ± 0.0**	30.523286 ± 0.004814	36.071183 ± 0.002663	41.552427 ± 0.049982
14	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.498707 ± 0.0**	30.524805 ± 0.004525	36.070778 ± 0.002649	41.563138 ± 0.02701
15	**16.132825 ± 0.0**	24.377677 ± 0.002664	**27.498707 ± 0.0**	30.524123 ± 0.006117	36.070394 ± 0.005158	41.57306 ± 0.016096
16	**16.132825 ± 0.0**	24.377677 ± 0.002664	**27.498707 ± 0.0**	30.524693 ± 0.0	36.071228 ± 0.002328	41.484161 ± 0.082742
17	**16.132825 ± 0.0**	24.377677 ± 0.002664	**27.498707 ± 0.0**	30.523249 ± 0.004894	36.070876 ± 0.003633	41.488675 ± 0.102816
18	**16.132825 ± 0.0**	**24.378519 ± 0.0**	27.498534 ± 0.000545	30.52553 ± 0.004745	36.024126 ± 0.091682	41.535365 ± 0.072491
19	-	**24.378519 ± 0.0**	**27.498707 ± 0.0**	30.491391 ± 0.059471	36.013759 ± 0.081229	41.542066 ± 0.062082
20	-	24.377677 ± 0.002664	**27.498707 ± 0.0**	30.482587 ± 0.054332	36.056212 ± 0.0306	41.535369 ± 0.068181
21	-	-	27.496814 ± 0.004403	30.51192 ± 0.019564	36.046899 ± 0.058355	41.552607 ± 0.054124
22	-	-	27.495582 ± 0.00519	30.512568 ± 0.037257	36.043957 ± 0.062114	41.53259 ± 0.070245
23	-	-	-	30.520961 ± 0.015498	36.057506 ± 0.018427	41.542313 ± 0.050972
24	-	-	-	30.51817 ± 0.015744	36.060504 ± 0.021301	41.458666 ± 0.119347
25	-	-	-	-	36.045706 ± 0.059431	41.485487 ± 0.119827
26	-	-	-	-	36.030006 ± 0.073915	41.479979 ± 0.111352
27	-	-	-	-	-	41.451492 ± 0.136212

Table A.2.: Absolute coalition structure values and their standard deviations over different seeds, summed over same-sized graphs, found by our iterative approach algorithm using QBSolv, with respect to k.

k	n=4	n=6	n=8	n=10	n=12	n=14	n=16
2	**2.440467 ± 0.0**	5.646442 ± 0.0	5.646442 ± 0.0	13.811595 ± 0.0	16.292316 ± 0.0	**20.594957 ± 0.0**	20.113989 ± 0.0
3	**2.440467 ± 0.0**	**5.730368 ± 0.0**	**5.730368 ± 0.0**	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	20.164471 ± 0.0
4	**2.440467 ± 0.0**	**5.730368 ± 0.0**	**5.730368 ± 0.0**	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
5	-	**5.730368 ± 0.0**	**5.730368 ± 0.0**	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
6	-	**5.730368 ± 0.0**	**5.730368 ± 0.0**	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
7	-	-	**5.730368 ± 0.0**	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
8	-	-	**5.730368 ± 0.0**	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
9	-	-	-	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
10	-	-	-	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
11	-	-	-	-	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
12	-	-	-	-	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
13	-	-	-	-	-	**20.594957 ± 0.0**	**20.193669 ± 0.0**
14	-	-	-	-	-	**20.594957 ± 0.0**	**20.193669 ± 0.0**
15	-	-	-	-	-	-	**20.193669 ± 0.0**
16	-	-	-	-	-	-	**20.193669 ± 0.0**

k	n=18	n=20	n=22	n=24	n=26	n=28
2	16.090014 ± 0.0	24.304977 ± 0.0	27.312814 ± 0.0	30.264435 ± 0.0	35.671803 ± 0.0	41.383586 ± 0.000216
3	16.129274 ± 0.005728	24.377135 ± 0.002917	27.489442 ± 0.014502	30.515788 ± 0.0	36.06689 ± 0.0	41.563002 ± 0.0
4	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.498707 ± 0.0**	**30.528199 ± 0.0**	**36.072025 ± 0.0**	**41.583699 ± 0.0**
5	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.498707 ± 0.0**	**30.528199 ± 0.0**	**36.072025 ± 0.0**	**41.583699 ± 0.0**
6	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.498707 ± 0.0**	**30.528199 ± 0.0**	36.07138 ± 0.002039	**41.583699 ± 0.0**
7	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.498707 ± 0.0**	**30.528199 ± 0.0**	**36.072025 ± 0.0**	**41.583699 ± 0.0**
8	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.498707 ± 0.0**	**30.528199 ± 0.0**	**36.072025 ± 0.0**	**41.583699 ± 0.0**
9	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.498707 ± 0.0**	**30.528199 ± 0.0**	**36.072025 ± 0.0**	**41.583699 ± 0.0**
10	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.498707 ± 0.0**	**30.528199 ± 0.0**	**36.072025 ± 0.0**	**41.583699 ± 0.0**
11	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.498707 ± 0.0**	**30.528199 ± 0.0**	**36.072025 ± 0.0**	**41.583699 ± 0.0**
12	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.498707 ± 0.0**	**30.528199 ± 0.0**	**36.072025 ± 0.0**	41.583143 ± 0.00176
13	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.498707 ± 0.0**	**30.528199 ± 0.0**	**36.072025 ± 0.0**	41.583143 ± 0.00176
14	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.498707 ± 0.0**	**30.528199 ± 0.0**	**36.072025 ± 0.0**	41.582586 ± 0.002346
15	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.498707 ± 0.0**	**30.528199 ± 0.0**	**36.072025 ± 0.0**	**41.583699 ± 0.0**
16	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.498707 ± 0.0**	**30.528199 ± 0.0**	36.07138 ± 0.002039	41.583143 ± 0.00176
17	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.498707 ± 0.0**	**30.528199 ± 0.0**	36.07138 ± 0.002039	41.582121 ± 0.00499
18	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.498707 ± 0.0**	30.527849 ± 0.001109	**36.072025 ± 0.0**	41.581303 ± 0.00536
19	-	**24.378519 ± 0.0**	**27.498707 ± 0.0**	30.527849 ± 0.001109	**36.072025 ± 0.0**	**41.583699 ± 0.0**
20	-	**24.378519 ± 0.0**	**27.498707 ± 0.0**	30.527849 ± 0.001109	**36.072025 ± 0.0**	41.582586 ± 0.002346
21	-	-	**27.498707 ± 0.0**	30.527849 ± 0.001109	**36.072025 ± 0.0**	41.581473 ± 0.002874
22	-	-	**27.498707 ± 0.0**	**30.528199 ± 0.0**	**36.072025 ± 0.0**	41.57994 ± 0.006022
23	-	-	-	**30.528199 ± 0.0**	**36.072025 ± 0.0**	41.58203 ± 0.002688
24	-	-	-	**30.528199 ± 0.0**	**36.072025 ± 0.0**	**41.583699 ± 0.0**
25	-	-	-	-	**36.072025 ± 0.0**	41.583143 ± 0.00176
26	-	-	-	-	**36.072025 ± 0.0**	41.583143 ± 0.00176
27	-	-	-	-	-	41.582586 ± 0.002346

Table A.3.: Absolute coalition structure values and their standard deviations over different seeds, summed over same-sized graphs, found by the iterative R-QUBO algorithm using QBSolv, with respect to k.

k	n=4	n=6	n=8	n=10	n=12	n=14	n=16
2	**2.440467 ± 0.0**	5.646442 ± 0.0	5.646442 ± 0.0	13.811595 ± 0.0	16.292316 ± 0.0	**20.594957 ± 0.0**	20.113989 ± 0.0
3	**2.440467 ± 0.0**	**5.730368 ± 0.0**	**5.730368 ± 0.0**	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	20.164471 ± 0.0
4	**2.440467 ± 0.0**	**5.730368 ± 0.0**	**5.730368 ± 0.0**	13.860904 ± 0.022794	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
5	-	**5.730368 ± 0.0**	5.707533 ± 0.025197	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
6	-	**5.730368 ± 0.0**	**5.730368 ± 0.0**	**13.871717 ± 0.0**	**16.415579 ± 0.0**	**20.594957 ± 0.0**	**20.193669 ± 0.0**
7	-	-	**5.730368 ± 0.0**	13.871265 ± 0.000583	16.384054 ± 0.016857	**20.594957 ± 0.0**	20.175395 ± 0.022744
8	-	-	5.730091 ± 0.000876	13.871378 ± 0.000546	16.413908 ± 0.005287	**20.594957 ± 0.0**	20.145508 ± 0.029689
9	-	-	-	13.870146 ± 0.001894	**16.415579 ± 0.0**	**20.594957 ± 0.0**	20.059914 ± 0.040676
10	-	-	-	13.866847 ± 0.005811	16.387986 ± 0.019041	**20.594957 ± 0.0**	20.036789 ± 0.042876
11	-	-	-	-	16.332476 ± 0.010462	**20.594957 ± 0.0**	20.0503 ± 0.0266
12	-	-	-	-	16.267825 ± 0.041424	**20.594957 ± 0.0**	20.073072 ± 0.034866
13	-	-	-	-	-	**20.594957 ± 0.0**	20.098112 ± 0.030219
14	-	-	-	-	-	**20.594957 ± 0.0**	20.124995 ± 0.024987
15	-	-	-	-	-	-	20.149502 ± 0.00956
16	-	-	-	-	-	-	20.146968 ± 0.009384

k	n=18	n=20	n=22	n=24	n=26	n=28
2	16.090014 ± 0.0	24.304977 ± 0.0	27.312814 ± 0.0	30.264435 ± 0.0	35.671803 ± 0.0	41.38372 ± 0.0
3	**16.132825 ± 0.0**	**24.378519 ± 0.0**	27.495913 ± 0.0	30.515788 ± 0.0	36.065595 ± 0.001671	41.563002 ± 0.0
4	**16.132825 ± 0.0**	24.378274 ± 0.000774	27.491923 ± 0.007415	**30.528199 ± 0.0**	**36.06985 ± 0.003551**	**41.580823 ± 0.002517**
5	**16.132825 ± 0.0**	**24.378519 ± 0.0**	**27.497025 ± 0.004516**	30.526937 ± 0.001276	36.0555 ± 0.021913	41.577013 ± 0.010224
6	**16.132825 ± 0.0**	24.374949 ± 0.007014	27.496711 ± 0.002937	30.51814 ± 0.011132	36.033754 ± 0.032778	41.569014 ± 0.009329
7	16.132535 ± 0.000505	24.371374 ± 0.009507	27.478105 ± 0.018779	30.482014 ± 0.02387	35.988939 ± 0.054891	41.531963 ± 0.062184
8	16.130268 ± 0.00537	24.35855 ± 0.018041	27.479318 ± 0.013352	30.458893 ± 0.039704	35.916308 ± 0.064649	41.467339 ± 0.090443
9	16.125578 ± 0.003541	24.35215 ± 0.015651	27.462284 ± 0.024329	30.437667 ± 0.053632	35.894095 ± 0.101476	41.368221 ± 0.109671
10	16.125157 ± 0.008761	24.353937 ± 0.023923	27.439164 ± 0.034097	30.420918 ± 0.06784	35.931454 ± 0.091705	41.369143 ± 0.113141
11	16.127946 ± 0.002641	24.344937 ± 0.02644	27.430835 ± 0.042906	30.436096 ± 0.048832	35.868234 ± 0.112716	41.35794 ± 0.125378
12	16.120533 ± 0.010851	24.333839 ± 0.023257	27.389887 ± 0.064502	30.412314 ± 0.097484	35.874125 ± 0.105169	41.299222 ± 0.152066
13	16.117694 ± 0.019813	24.341452 ± 0.03568	27.39555 ± 0.056395	30.393618 ± 0.111756	35.814613 ± 0.132651	41.309285 ± 0.179304
14	16.099314 ± 0.033749	24.328693 ± 0.050116	27.361843 ± 0.093837	30.355603 ± 0.149338	35.820149 ± 0.132432	41.306121 ± 0.174845
15	16.090537 ± 0.033415	24.297987 ± 0.084469	27.370932 ± 0.082579	30.324935 ± 0.151684	35.725282 ± 0.208147	41.24464 ± 0.173543
16	16.096083 ± 0.021781	24.314373 ± 0.073871	27.311321 ± 0.12993	30.282915 ± 0.168514	35.712298 ± 0.205471	41.280076 ± 0.175964
17	16.067884 ± 0.046374	24.320094 ± 0.065647	27.287166 ± 0.134293	30.267938 ± 0.146569	35.458334 ± 0.217203	41.247096 ± 0.167926
18	16.042622 ± 0.066127	24.280438 ± 0.080803	27.234512 ± 0.143771	30.213725 ± 0.173274	35.750658 ± 0.144467	41.142765 ± 0.199723
19	-	24.264844 ± 0.100333	27.211285 ± 0.152105	30.326616 ± 0.137686	35.719571 ± 0.185505	41.127457 ± 0.174406
20	-	24.262796 ± 0.090541	27.206511 ± 0.192214	30.259103 ± 0.133345	35.559253 ± 0.254308	41.126277 ± 0.179783
21	-	-	27.294453 ± 0.113973	30.044881 ± 0.207552	35.496743 ± 0.219594	41.103762 ± 0.186705
22	-	-	27.249678 ± 0.147332	30.018207 ± 0.220156	35.460303 ± 0.267318	41.078654 ± 0.208595
23	-	-	-	29.967773 ± 0.204945	35.471735 ± 0.291653	41.024752 ± 0.21581
24	-	-	-	29.987997 ± 0.209013	35.348171 ± 0.289284	41.056739 ± 0.197249
25	-	-	-	-	35.298207 ± 0.328125	41.061961 ± 0.194038
26	-	-	-	-	35.488716 ± 0.248712	41.044621 ± 0.210814
27	-	-	-	-	-	41.006722 ± 0.211599

Table A.4.: Absolute coalition structure values and their standard deviations over different seeds, summed over same-sized graphs, found by the k-split GCS-Q (exactly) algorithm using QBSolv, with respect to k. Note that the values listed for $k = 2$ are those of GCS-Q.

k	n=4	n=6	n=8	n=10	n=12	n=14	n=16
2	**2.440467 ± 0.0**	5.646442 ± 0.0	5.646442 ± 0.0	**13.811595 ± 0.0**	16.292316 ± 0.0	**20.594957 ± 0.0**	**20.113989 ± 0.0**
3	**2.440467 ± 0.0**	**5.730368 ± 0.0**	**5.730368 ± 0.0**	13.357127 ± 0.0	**16.415579 ± 0.0**	**20.594957 ± 0.0**	19.597108 ± 0.0
4	**2.440467 ± 0.0**	**5.730368 ± 0.0**	**5.730368 ± 0.0**	13.362198 ± 0.000513	16.104118 ± 0.0	**20.594957 ± 0.0**	19.626306 ± 0.0
5	-	**5.730368 ± 0.0**	**5.730368 ± 0.0**	13.36236 ± 0.0	16.104118 ± 0.0	**20.594957 ± 0.0**	19.626306 ± 0.0
6	-	**5.730368 ± 0.0**	**5.730368 ± 0.0**	13.36236 ± 0.0	16.042332 ± 0.195382	**20.594957 ± 0.0**	19.626306 ± 0.0
7	-	-	**5.730368 ± 0.0**	13.36236 ± 0.0	15.856976 ± 0.319058	**20.594957 ± 0.0**	19.626306 ± 0.0
8	-	-	**5.730368 ± 0.0**	13.36236 ± 0.0	15.733406 ± 0.319058	**20.594957 ± 0.0**	19.626306 ± 0.0
9	-	-	-	13.36236 ± 0.0	15.609835 ± 0.26051	**20.594957 ± 0.0**	19.626306 ± 0.0
10	-	-	-	13.36236 ± 0.0	15.67162 ± 0.298452	**20.594957 ± 0.0**	19.626306 ± 0.0
11	-	-	-	-	15.609835 ± 0.26051	**20.594957 ± 0.0**	19.626306 ± 0.0
12	-	-	-	-	15.486264 ± 0.0	**20.594957 ± 0.0**	19.626306 ± 0.0
13	-	-	-	-	-	**20.594957 ± 0.0**	19.626306 ± 0.0
14	-	-	-	-	-	**20.594957 ± 0.0**	19.626306 ± 0.0
15	-	-	-	-	-	-	19.626306 ± 0.0
16	-	-	-	-	-	-	19.626306 ± 0.0
k	n=18	n=20	n=22	n=24	n=26	n=28	
2	**16.090014 ± 0.0**	**24.304977 ± 0.0**	**27.312814 ± 0.0**	**30.264435 ± 0.0**	35.671803 ± 0.0	**41.38372 ± 0.0**	
3	16.04777 ± 0.0	23.758079 ± 0.0	26.522783 ± 0.0	29.675491 ± 0.0	**35.941809 ± 0.0**	41.078252 ± 0.0	
4	16.04777 ± 0.0	24.229105 ± 0.0	26.525577 ± 0.0	29.687902 ± 0.0	35.88456 ± 0.022108	41.098689 ± 0.000823	
5	16.047719 ± 0.000107	24.229105 ± 0.0	26.525577 ± 0.0	29.687902 ± 0.0	35.898798 ± 0.033332	41.098949 ± 0.0	
6	16.04777 ± 0.0	24.229105 ± 0.0	26.525577 ± 0.0	29.687902 ± 0.0	35.906241 ± 0.035093	41.095522 ± 0.004039	
7	16.04777 ± 0.0	24.229105 ± 0.0	26.525577 ± 0.0	29.687862 ± 0.000128	35.864134 ± 0.141374	41.093652 ± 0.004956	
8	16.04777 ± 0.0	24.229105 ± 0.0	26.525321 ± 0.000539	29.687902 ± 0.0	35.904488 ± 0.088458	41.014104 ± 0.171288	
9	16.04777 ± 0.0	24.229105 ± 0.0	26.525449 ± 0.000404	29.687902 ± 0.0	35.828886 ± 0.116128	41.052169 ± 0.130423	
10	16.04777 ± 0.0	24.229105 ± 0.0	26.525577 ± 0.0	29.687822 ± 0.00017	35.874305 ± 0.005136	41.05063 ± 0.132688	
11	16.04777 ± 0.0	24.229105 ± 0.0	26.431281 ± 0.033492	29.687902 ± 0.0	35.854916 ± 0.065721	41.009625 ± 0.171995	
12	16.04777 ± 0.0	24.229105 ± 0.0	26.525577 ± 0.0	29.687682 ± 0.000465	35.860541 ± 0.073027	41.094197 ± 0.007421	
13	16.04777 ± 0.0	24.229105 ± 0.0	26.473006 ± 0.055684	29.687902 ± 0.0	35.820457 ± 0.109053	41.008415 ± 0.175699	
14	16.04777 ± 0.0	24.229105 ± 0.0	26.49406 ± 0.050946	29.687902 ± 0.0	35.877559 ± 0.004741	41.048435 ± 0.134834	
15	16.04777 ± 0.0	24.229105 ± 0.0	26.525449 ± 0.000404	29.687862 ± 0.000128	35.867627 ± 0.0293	41.046082 ± 0.134986	
16	16.04777 ± 0.0	24.205721 ± 0.073947	26.525194 ± 0.000617	29.687902 ± 0.0	35.872795 ± 0.003446	40.927915 ± 0.215303	
17	16.04777 ± 0.0	24.229105 ± 0.0	26.514986 ± 0.033491	29.687752 ± 0.000477	35.870467 ± 0.024125	40.970076 ± 0.20112	
18	16.04777 ± 0.0	24.182337 ± 0.098595	26.525128 ± 0.000744	29.686198 ± 0.004537	35.867792 ± 0.054512	41.093676 ± 0.005805	
19	-	24.178125 ± 0.161214	26.525066 ± 0.00066	29.687792 ± 0.000349	35.77856 ± 0.150923	41.091055 ± 0.008388	
20	-	24.229105 ± 0.0	26.525321 ± 0.000539	29.687601 ± 0.000635	35.879058 ± 0.0	41.09387 ± 0.004371	
21	-	-	26.486214 ± 0.124477	29.729704 ± 0.132187	35.879058 ± 0.0	41.090474 ± 0.007161	
22	-	-	26.504651 ± 0.044116	29.687902 ± 0.0	35.879058 ± 0.0	41.090219 ± 0.005405	
23	-	-	-	29.729704 ± 0.132187	35.879058 ± 0.0	41.091071 ± 0.003498	
24	-	-	-	29.771505 ± 0.17625	35.879058 ± 0.0	41.091132 ± 0.007622	
25	-	-	-	-	35.879058 ± 0.0	41.091646 ± 0.007855	
26	-	-	-	-	35.878411 ± 0.002045	41.091641 ± 0.008357	
27	-	-	-	-	-	41.09282 ± 0.008949	

Table A.5.: Absolute coalition structure values and their standard deviations over different seeds, summed over same-sized graphs, found by the k-split GCS-Q (at most) algorithm using QBSolv, with respect to k. Note that the values listed for $k = 2$ are those of GCS-Q.

A.2. QAOA

k	n=4	n=6	n=8	n=10	n=12	n=14	n=16
2	**2.440467 ± 0.0**	**5.633437 ± 0.031856**	**5.591161 ± 0.102073**	**13.0152 ± 0.816616**	**1.983832 ± 0.0**	-	-
3	2.40302 ± 0.075596	4.583137 ± 1.329839	-	-	-	-	-
4	2.373181 ± 0.07926	0.471036 ± 0.0	-	-	-	-	-
k	n=18	n=20	n=22	n=24	n=26	n=28	
2	-	-	-	-	-	-	
3	-	-	-	-	-	-	
4	-	-	-	-	-	-	

Table A.6.: Absolute coalition structure values and their standard deviations over different seeds, summed over same-sized graphs, found by the iterative Kochenberger algorithm using QAOA, with respect to k.

k	n=4	n=6	n=8	n=10	n=12	n=14	n=16
2	**2.440467 ± 0.0**	**5.553121 ± 0.233095**	**5.641029 ± 0.163598**	**11.418322 ± 1.531251**	-	-	-
3	2.430145 ± 0.02517	5.13724 ± 0.723873	0.716319 ± 0.0	-	-	-	-
4	2.391381 ± 0.058587	0.048302 ± 0.0	-	-	-	-	-
k	n=18	n=20	n=22	n=24	n=26	n=28	
2	-	-	-	-	-	-	
3	-	-	-	-	-	-	
4	-	-	-	-	-	-	

Table A.7.: Absolute coalition structure values and their standard deviations over different seeds, summed over same-sized graphs, found by our iterative algorithm using QAOA, with respect to k.

k	n=4	n=6	n=8	n=10	n=12	n=14	n=16
2	**2.440467 ± 0.0**	5.646442 ± 0.0	5.646442 ± 0.0	**13.811595 ± 0.0**	**16.235949 ± 0.100059**	**20.392302 ± 0.278018**	**19.367952 ± 0.577163**
3	**2.440467 ± 0.0**	**5.700515 ± 0.073124**	**5.694202 ± 0.077087**	11.612923 ± 1.303109	6.039428 ± 0.01403	-	-
4	2.420075 ± 0.031591	5.261301 ± 0.635674	0.63146 ± 0.0	-	-	-	-
k	n=18	n=20	n=22	n=24	n=26	n=28	
2	**15.68992 ± 0.305821**	**23.464154 ± 0.630882**	**26.141704 ± 0.809975**	-	-	-	
3	-	-	-	-	-	-	
4	-	-	-	-	-	-	

Table A.8.: Absolute coalition structure values and their standard deviations over different seeds, summed over same-sized graphs, found by the iterative R-QUBO algorithm using QAOA, with respect to k.

k	n=4	n=6	n=8	n=10	n=12	n=14	n=16
2	**2.440467 ± 0.0**	**5.646442 ± 0.0**	**5.646442 ± 0.0**	**13.811595 ± 0.0**	**16.235949 ± 0.100059**	**20.392302 ± 0.278018**	**19.367952 ± 0.577163**
3	2.42955 ± 0.020195	4.417872 ± 1.358098	-	-	-	-	-
4	2.356983 ± 0.080364	0.467779 ± 0.0	-	-	-	-	-
k	n=18	n=20	n=22	n=24	n=26	n=28	
2	**15.689832 ± 0.305843**	**23.464154 ± 0.630882**	**26.153374 ± 0.774493**	**29.00868 ± 0.67023**	-	-	
3	-	-	-	-	-	-	
4	-	-	-	-	-	-	

Table A.9.: Absolute coalition structure values and their standard deviations over different seeds, summed over same-sized graphs, found by the k-split GCS-Q (exactly) algorithm using QAOA, with respect to k. Note that the values listed for $k = 2$ are those of GCS-Q.

k	n=4	n=6	n=8	n=10	n=12	n=14	n=16
2	**2.440467 ± 0.0**	**5.646442 ± 0.0**	**5.646442 ± 0.0**	**13.811595 ± 0.0**	**16.235949 ± 0.100059**	**20.392302 ± 0.278018**	**19.367952 ± 0.577163**
3	2.419845 ± 0.031947	5.241861 ± 0.583066	-	-	-	-	-
4	2.379752 ± 0.05613	0.187935 ± 0.0	-	-	-	-	-
k	n=18	n=20	n=22	n=24	n=26	n=28	
2	**15.689832 ± 0.305843**	**23.464154 ± 0.630882**	**26.153374 ± 0.774493**	**29.00868 ± 0.67023**	-	-	
3	-	-	-	-	-	-	
4	-	-	-	-	-	-	

Table A.10.: Absolute coalition structure values and their standard deviations over different seeds, summed over same-sized graphs, found by the k-split GCS-Q (at most) algorithm using QAOA, with respect to k. Note that the values listed for $k = 2$ are those of GCS-Q.

A.3. D-Wave

k	n=4	n=6	n=8	n=10	n=12	n=14	n=16
2	**2.440467 ± 0.0**	5.646442 ± 0.0	5.646442 ± 0.0	**13.386766 ± 0.0**	**14.726085 ± 0.0**	**19.324076 ± 0.0**	**17.190776 ± 0.0**
3	**2.440467 ± 0.0**	**5.730368 ± 0.0**	**5.730368 ± 0.0**	12.306452 ± 0.0	13.029649 ± 0.0	18.111121 ± 0.0	14.880642 ± 0.0
4	**2.440467 ± 0.0**	5.669112 ± 0.0	5.51534 ± 0.0	10.3575 ± 0.0	11.730319 ± 0.0	17.592222 ± 0.0	14.005656 ± 0.0
5	-	5.383941 ± 0.0	5.329265 ± 0.0	9.36715 ± 0.0	10.031929 ± 0.0	17.238651 ± 0.0	13.015383 ± 0.0
k	n=18	n=20	n=22	n=24	n=26	n=28	
2	**14.282999 ± 0.0**	**20.61762 ± 0.0**	**22.158941 ± 0.0**	**23.894532 ± 0.0**	**27.222132 ± 0.0**	**30.757303 ± 0.0**	
3	12.963522 ± 0.0	18.688685 ± 0.0	19.921898 ± 0.0	21.402715 ± 0.0	24.352217 ± 0.0	29.105129 ± 0.0	
4	12.368743 ± 0.0	17.276334 ± 0.0	18.890994 ± 0.0	21.255604 ± 0.0	23.533464 ± 0.0	28.178373 ± 0.0	
5	12.065486 ± 0.0	16.698848 ± 0.0	18.482499 ± 0.0	21.255604 ± 0.0	23.425963 ± 0.0	28.178373 ± 0.0	

Table A.11.: Absolute coalition structure values and their standard deviations over different seeds, summed over same-sized graphs, found by the iterative Kochenberger algorithm using the D-Wave quantum annealer, with respect to k.

k	n=4	n=6	n=8	n=10	n=12	n=14	n=16
2	**2.440467 ± 0.0**	5.684492 ± 0.0	5.722814 ± 0.0	**12.930637 ± 0.0**	**13.53964 ± 0.0**	**18.649881 ± 0.0**	**15.805872 ± 0.0**
3	**2.440467 ± 0.0**	**5.730368 ± 0.0**	**5.728384 ± 0.0**	12.203813 ± 0.0	12.908717 ± 0.0	18.223068 ± 0.0	15.059966 ± 0.0
4	**2.440467 ± 0.0**	5.693682 ± 0.0	5.628224 ± 0.0	11.188372 ± 0.0	11.530981 ± 0.0	17.763616 ± 0.0	13.895217 ± 0.0
5	-	5.654714 ± 0.0	5.525091 ± 0.0	10.43384 ± 0.0	11.537044 ± 0.0	17.289659 ± 0.0	13.225933 ± 0.0
k	n=18	n=20	n=22	n=24	n=26	n=28	
2	**13.352804 ± 0.0**	**19.562613 ± 0.0**	**20.39952 ± 0.0**	**22.014417 ± 0.0**	**24.579125 ± 0.0**	**28.495126 ± 0.0**	
3	12.767448 ± 0.0	17.908693 ± 0.0	19.404577 ± 0.0	21.340825 ± 0.0	23.738384 ± 0.0	28.178373 ± 0.0	
4	12.217459 ± 0.0	17.713204 ± 0.0	18.778927 ± 0.0	21.255604 ± 0.0	23.427951 ± 0.0	28.178373 ± 0.0	
5	12.0623 ± 0.0	17.097025 ± 0.0	18.608498 ± 0.0	21.255604 ± 0.0	23.448728 ± 0.0	28.178373 ± 0.0	

Table A.12.: Absolute coalition structure values and their standard deviations over different seeds, summed over same-sized graphs, found by the our iterative algorithm using the D-Wave quantum annealer, with respect to k.

k	n=4	n=6	n=8	n=10	n=12	n=14	n=16
2	**2.440467 ± 0.0**	5.646442 ± 0.0	5.646442 ± 0.0	**13.811595 ± 0.0**	**16.292316 ± 0.0**	**20.594957 ± 0.0**	**20.037918 ± 0.0**
3	**2.440467 ± 0.0**	**5.730368 ± 0.0**	**5.730368 ± 0.0**	13.009123 ± 0.0	14.333686 ± 0.0	18.757254 ± 0.0	16.115013 ± 0.0
4	**2.440467 ± 0.0**	**5.730368 ± 0.0**	5.701853 ± 0.0	11.944105 ± 0.0	13.053354 ± 0.0	18.003253 ± 0.0	14.798375 ± 0.0
5	-	5.672115 ± 0.0	5.71574 ± 0.0	10.751086 ± 0.0	11.646397 ± 0.0	17.721881 ± 0.0	14.079037 ± 0.0
k	n=18	n=20	n=22	n=24	n=26	n=28	
2	**16.087064 ± 0.0**	**24.304977 ± 0.0**	**27.312814 ± 0.0**	**30.264435 ± 0.0**	**35.671803 ± 0.0**	**41.368105 ± 0.0**	
3	13.735316 ± 0.0	20.043987 ± 0.0	21.213422 ± 0.0	22.474693 ± 0.0	25.468732 ± 0.0	29.592212 ± 0.0	
4	12.860602 ± 0.0	18.928536 ± 0.0	19.424573 ± 0.0	21.717426 ± 0.0	24.374819 ± 0.0	28.402086 ± 0.0	
5	12.346493 ± 0.0	17.669831 ± 0.0	19.195381 ± 0.0	21.332523 ± 0.0	23.853112 ± 0.0	28.426259 ± 0.0	

Table A.13.: Absolute coalition structure values and their standard deviations over different seeds, summed over same-sized graphs, found by the iterative R-QUBO algorithm using the D-Wave quantum annealer, with respect to k.

k	n=4	n=6	n=8	n=10	n=12	n=14	n=16
2	**2.440467 ± 0.0**	5.646442 ± 0.0	5.646442 ± 0.0	**13.811595 ± 0.0**	**16.292316 ± 0.0**	**20.594957 ± 0.0**	**20.113989 ± 0.0**
3	**2.440467 ± 0.0**	**5.730368 ± 0.0**	**5.730368 ± 0.0**	12.974557 ± 0.0	14.000105 ± 0.0	18.97944 ± 0.0	15.220979 ± 0.0
4	**2.440467 ± 0.0**	5.655527 ± 0.0	5.690405 ± 0.0	11.010027 ± 0.0	12.440682 ± 0.0	17.621557 ± 0.0	13.269866 ± 0.0
5	-	5.587994 ± 0.0	5.401423 ± 0.0	10.424235 ± 0.0	10.966233 ± 0.0	17.593977 ± 0.0	13.262796 ± 0.0
k	n=18	n=20	n=22	n=24	n=26	n=28	
2	**16.090174 ± 0.0**	**24.303249 ± 0.0**	**27.312814 ± 0.0**	**30.264435 ± 0.0**	**35.626961 ± 0.0**	**41.381101 ± 0.0**	
3	13.322383 ± 0.0	19.235553 ± 0.0	20.690535 ± 0.0	22.492371 ± 0.0	24.779801 ± 0.0	28.991672 ± 0.0	
4	12.644449 ± 0.0	17.759534 ± 0.0	18.947119 ± 0.0	21.255604 ± 0.0	23.425963 ± 0.0	28.178373 ± 0.0	
5	12.378765 ± 0.0	16.873185 ± 0.0	18.482499 ± 0.0	21.255604 ± 0.0	23.425963 ± 0.0	28.178373 ± 0.0	

Table A.14.: Absolute coalition structure values and their standard deviations over different seeds, summed over same-sized graphs, found by the k-split GCS-Q (exactly) algorithm using the D-Wave quantum annealer, with respect to k. Note that the values listed for $k = 2$ are those of GCS-Q.