

Table 1: Test results of the six methods for problems 3.1-3.2

TP	DIM	ISP	IDKM			ACGD			MDKM			TTMDY			PCG		
			#IT	FV	PT(s)	Norm	#IT	FV	PT(s)	Norm	#IT	FV	PT(s)	Norm	#IT	FV	PT
3.1	10000	x1	3	37	0.0523	0	19	48	0.1121	0	17	43	0.1729	5.9743E-10	47	199	0.3957
	10000	x2	2	25	0.0269	0	20	59	0.0949	0	18	49	0.1661	6.6258E-10	50	216	0.3536
	10000	x3	1	13	0.0162	0	20	56	0.0952	0	18	55	0.1569	6.5699E-10	56	252	0.4118
	10000	x4	1	13	0.0153	0	19	48	0.0906	0	17	43	0.1356	6.3609E-10	14	66	0.1543
	10000	x5	1	13	0.0129	0	18	47	0.0991	0	18	49	0.1460	2.7656E-10	14	70	0.1092
	10000	x6	1	13	0.0125	0	1	13	0.0152	0	1	13	0.0264	0	1	13	0.0224
	10000	x7	1	13	0.0154	0	1	13	0.0162	0	1	13	0.0340	0	1	13	0.0224
	50000	x1	3	37	0.1556	0	20	50	0.3349	0	18	45	0.4482	3.2060E-10	50	211	1.3610
	50000	x2	2	25	0.1250	0	21	61	0.3820	0	19	51	0.4929	3.5558E-10	52	224	1.3525
	50000	x3	1	13	0.0573	0	20	58	0.3555	0	19	57	0.5204	3.5259E-10	56	252	1.5445
	50000	x4	1	13	0.0649	0	19	48	0.3057	0	17	43	0.4637	8.1184E-10	14	66	0.4370
	50000	x5	1	13	0.0609	0	18	47	0.3032	0	18	49	0.4753	6.1835E-10	15	74	0.5024
	50000	x6	1	13	0.0685	0	1	13	0.0680	0	1	13	0.1242	0	1	13	0.1147
	50000	x7	1	13	0.0608	0	1	13	0.0699	0	1	13	0.0882	0	1	13	0.1188
	100000	x1	3	37	0.2946	0	20	50	0.6446	0	18	45	0.8494	4.5340E-10	50	211	2.4491
	100000	x2	2	25	0.2196	0	22	61	0.7004	0	19	51	0.8855	5.0286E-10	52	224	2.5961
	100000	x3	1	13	0.1116	0	21	58	0.6767	0	19	57	1.1415	4.9864E-10	58	260	3.0318
	100000	x4	1	13	0.1280	0	20	50	0.6682	0	18	45	0.7967	2.7553E-10	15	70	0.8300
	100000	x5	1	13	0.1221	0	19	49	0.6044	0	18	49	0.8750	8.7448E-10	15	74	0.9159
	100000	x6	1	13	0.1296	0	1	13	0.1040	0	1	13	0.1673	0	1	13	0.1702
	100000	x7	1	13	0.1131	0	1	13	0.1164	0	1	13	0.1909	0	1	13	0.1755
3.2	10000	x1	11	117	0.1340	3.4438E-10	16	73	0.1259	0	13	57	0.1597	6.5114E-10	99	600	0.8901
	10000	x2	11	114	0.1557	9.5452E-11	16	74	0.1252	0	14	66	0.1564	7.9834E-10	103	633	1.0129
	10000	x3	2	25	0.0248	0	17	82	0.1616	0	16	79	0.2224	1.4600E-10	87	539	0.8167
	10000	x4	2	25	0.0360	0	15	69	0.1357	0	14	63	0.1656	1.9983E-10	39	234	0.4572
	10000	x5	2	25	0.0246	0	16	71	0.1294	0	13	60	0.1579	2.5716E-10	44	273	0.4552
	10000	x6	2	25	0.0392	0	9	59	0.0787	0	14	68	0.1569	5.0877E-10	39	225	0.4099
	10000	x7	2	25	0.0338	0	7	48	0.0706	0	2	25	0.0393	0	41	252	0.4344
	50000	x1	10	117	0.4874	4.0901E-10	16	73	0.4038	0	14	61	0.5231	1.6933E-10	102	618	3.8234
	50000	x2	11	114	0.5051	1.4120E-10	17	74	0.3971	0	15	70	0.6064	1.7540E-10	100	621	3.8357
	50000	x3	2	25	0.1373	0	18	82	0.4519	0	16	79	0.6453	3.2636E-10	107	661	4.0168
	50000	x4	2	25	0.1430	0	16	73	0.3931	0	14	63	0.5394	4.4685E-10	38	228	1.5249
	50000	x5	2	25	0.1322	0	16	71	0.4053	0	13	60	0.5109	5.7515E-10	46	283	1.8261
	50000	x6	2	25	0.1359	0	8	51	0.2736	0	14	68	0.5776	5.0842E-10	38	224	1.4287
	50000	x7	2	25	0.1369	0	13	94	0.4410	0	2	25	0.2029	0	52	318	1.9857
	100000	x1	11	117	0.9435	5.2391E-10	17	77	0.8172	0	14	61	0.9564	2.3810E-10	104	630	7.4852
	100000	x2	11	114	0.9126	1.8698E-10	18	78	0.8494	0	15	70	1.0598	2.4025E-10	102	626	7.4144
	100000	x3	2	25	0.2247	0	18	86	0.9143	0	16	79	1.1604	4.6155E-10	109	673	7.9966
	100000	x4	2	25	0.2392	0	17	73	0.8004	0	14	63	1.0431	6.3195E-10	42	250	3.0397
	100000	x5	2	25	0.2240	0	16	75	0.8743	0	13	60	0.9008	8.1339E-10	43	261	3.1651
	100000	x6	2	25	0.2383	0	10	60	0.6480	0	14	68	0.9827	5.0837E-10	56	263	3.5427
	100000	x7	2	25	0.2313	0	10	72	0.6818	0	2	25	0.3952	0	41	248	3.0365

Table 2: Test results of the six methods for problems 3.3-3.4

TP	DIM	ISP	IDKM				ACGD				MDKM				TTMDY				PCG			
			#IT	FV	PT(s)	Norm	#IT	FV	PT(s)	Norm	#IT	FV	PT(s)	Norm	#IT	FV	PT(s)	Norm	#IT	FV	PT	Norm
3.3	10000	x1	11	21	0.0804	0	16	41	0.1111	0	17	33	0.1973	9.1630E-10	47	189	0.4824	0	-	-	-	-
	10000	x2	11	21	0.0912	0	13	23	0.0759	0	17	33	0.1801	9.8279E-10	52	206	0.5269	0	-	-	-	-
	10000	x3	12	22	0.0698	0	17	30	0.1021	0	18	34	0.1974	2.4454E-10	52	204	0.4784	6.2801E-10	-	-	-	-
	10000	x4	12	23	0.0699	0	6	8	0.0393	0	18	35	0.1476	5.3523E-10	15	60	0.1853	3.7484E-10	-	-	-	-
	10000	x5	12	22	0.0745	0	7	9	0.0491	0	18	34	0.1573	3.9620E-10	14	55	0.1755	2.2025E-10	-	-	-	-
	10000	x6	13	24	0.0768	0	7	9	0.0431	0	19	36	0.1947	8.5572E-10	15	58	0.1771	2.2398E-10	-	-	-	-
	10000	x7	13	23	0.0762	0	10	14	0.0708	0	19	35	0.1885	0	16	62	0.1851	3.5304E-10	31	33	0.2385	5.7972E-10
	50000	x1	11	21	0.2410	0	19	37	0.3965	0	18	35	0.5714	4.9008E-10	49	197	1.8028	0	-	-	-	-
	50000	x2	12	21	0.2379	0	17	32	0.3395	0	18	35	0.5431	5.2400E-10	57	226	2.0576	0	-	-	-	-
	50000	x3	12	22	0.2737	0	20	38	0.4214	0	18	34	0.5549	0	54	212	1.9954	0	-	-	-	-
	50000	x4	12	23	0.2562	0	17	32	0.3465	0	19	37	0.5735	2.8524E-10	15	60	0.6301	8.3163E-10	-	-	-	-
	50000	x5	12	22	0.2502	0	15	27	0.2894	0	18	34	0.5800	0	14	55	0.6262	0	-	-	-	-
	50000	x6	13	24	0.2652	0	18	33	0.3637	0	20	38	0.6438	0	15	58	0.6292	4.9476E-10	-	-	-	-
	50000	x7	13	23	0.2751	0	16	28	0.3129	0	20	37	0.6042	0	16	62	0.6281	7.8208E-10	31	33	0.7059	5.7941E-10
	100000	x1	11	21	0.4519	0	19	80	1.0729	0	18	35	1.0995	6.9274E-10	49	197	3.7176	0	-	-	-	-
	100000	x2	12	23	0.4735	0	19	35	0.7700	0	18	35	1.0262	7.4046E-10	58	230	4.1332	0	-	-	-	-
	100000	x3	12	22	0.4949	0	20	38	0.8021	0	18	34	1.0942	7.7681E-10	54	212	3.8044	5.0407E-10	-	-	-	-
	100000	x4	12	23	0.4974	0	17	32	0.6558	0	19	37	1.1088	4.0304E-10	16	64	1.2279	1.9155E-10	-	-	-	-
	100000	x5	12	22	0.5082	0	15	27	0.5859	0	19	36	1.0631	0	14	55	1.0668	6.7955E-10	-	-	-	-
	100000	x6	13	24	0.5612	0	19	35	0.7607	0	20	38	1.1953	6.4402E-10	15	58	1.1169	0	-	-	-	-
	100000	x7	14	25	0.5829	0	17	30	0.6556	0	20	37	1.1260	3.4406E-10	17	66	1.2530	1.8003E-10	31	33	1.3036	5.7937E-10
3.4	10000	x1	11	33	0.0997	0	19	42	0.0936	0	17	38	0.1567	7.8204E-10	57	233	0.4256	8.5860E-10	2	15	0.0375	0
	10000	x2	11	37	0.0842	0	19	43	0.1181	0	18	42	0.1719	6.0327E-10	53	226	0.4747	9.9094E-10	2	15	0.0394	0
	10000	x3	12	50	0.0949	0	19	43	0.1180	0	18	42	0.1760	6.2656E-10	44	192	0.3882	0	2	16	0.0564	0
	10000	x4	10	31	0.0569	0	19	43	0.1005	0	18	41	0.1469	2.6883E-10	14	61	0.1474	3.6312E-10	31	50	0.2203	8.9282E-10
	10000	x5	10	32	0.0708	0	19	43	0.0963	0	17	39	0.1597	4.4741E-10	14	61	0.1866	2.5214E-10	31	50	0.2074	9.5706E-10
	10000	x6	10	32	0.0701	0	19	43	0.1033	0	17	39	0.1906	5.3947E-10	14	61	0.1497	2.9542E-10	31	50	0.1950	9.5706E-10
	10000	x7	10	31	0.0643	0	19	43	0.1152	0	18	41	0.1527	3.4087E-10	14	61	0.1545	3.1206E-10	30	33	0.2216	6.4006E-10
	50000	x1	11	33	0.2512	0	19	42	0.3469	0	18	40	0.5174	4.1968E-10	59	241	1.7541	8.9377E-10	2	15	0.1483	0
	50000	x2	11	37	0.2488	0	20	45	0.3745	0	19	44	0.5243	3.2375E-10	60	254	1.8145	3.8481E-10	2	15	0.1622	0
	50000	x3	12	50	0.3106	0	20	45	0.3612	0	19	44	0.5581	3.3625E-10	43	187	1.3995	0	2	16	0.1734	0
	50000	x4	10	31	0.2231	0	19	43	0.3482	0	18	41	0.5441	6.0113E-10	14	61	0.4941	8.1197E-10	2	15	0.1691	0
	50000	x5	10	32	0.2446	0	19	43	0.3386	0	18	41	0.5040	2.4011E-10	14	61	0.5078	5.6380E-10	2	15	0.1691	0
	50000	x6	10	32	0.2282	0	19	43	0.3491	0	18	41	0.5721	2.8951E-10	14	61	0.5032	0	2	15	0.1678	0
	50000	x7	10	31	0.2315	0	19	43	0.3538	0	18	41	0.5106	0	14	61	0.5305	6.9780E-10	30	33	0.6450	6.4014E-10
	100000	x1	11	33	0.4278	0	19	42	2.0502	0	18	40	0.9424	5.9352E-10	61	249	3.5144	5.4221E-10	2	15	0.2918	0
	100000	x2	11	37	0.4759	0	20	45	1.0640	0	19	44	0.9713	4.5785E-10	61	258	3.6069	3.4755E-10	2	15	0.2435	0
	100000	x3	13	52	0.6428	0	20	45	0.9571	0	19	44	1.0094	4.7553E-10	44	192	2.6624	0	2	16	0.2923	0
	100000	x4	10	31	0.4283	0	20	45	1.0304	0	18	41	0.9245	8.5013E-10	15	65	1.0131	0	2	15	0.3056	0
	100000	x5	10	32	0.4476	0	19	43	0.9442	0	18	41	0.8860	3.3956E-10	14	61	0.9579	7.9734E-10	2	15	0.2470	0
	100000	x6	10	32	0.4533	0	20	45	0.9935	0	18	41	1.0269	4.0943E-10	14	61	0.9428	9.3420E-10	2	15	0.2430	0
	100000	x7	10	31	0.4456	0	20	45	0.9955	0	19	43	0.9961	2.5870E-10	14	61	0.9879	9.8684E-10	30	33	1.1376	6.4015E-10



Table 4: Test results of the six methods for problem 7

TP	DIM	ISP	IDKM			ACGD			MDKM			TTMDY			PCG							
			#IT	FV	PT(s)	Norm	#IT	FV	PT(s)	Norm	#IT	FV	PT(s)	Norm	#IT	FV	PT	Norm				
3.7	10000	x1	17	135	0.1760	7.5302E-10	20	80	0.2303	4.4120E-10	17	68	0.2042	4.2650E-10	40	240	0.4329	4.5080E-10	27	78	0.2558	2.3321E-10
	10000	x2	13	111	0.1425	5.7303E-10	22	83	0.2160	3.1476E-10	19	71	0.1972	2.2135E-10	36	214	0.4141	1.5820E-10	28	96	0.2608	5.4132E-10
	10000	x3	11	97	0.1178	8.1938E-11	18	73	0.2239	6.2638E-10	15	61	0.1674	5.1370E-10	45	271	0.4705	8.7182E-10	40	216	0.4495	5.4696E-10
	10000	x4	8	75	0.0964	7.8740E-10	18	74	0.1900	5.0485E-10	15	62	0.1845	3.5301E-10	12	74	0.1678	3.7118E-10	21	57	0.1903	4.2649E-10
	10000	x5	8	76	0.0848	8.2651E-11	18	74	0.2329	6.0760E-10	15	63	0.1797	7.6575E-10	13	81	0.1603	1.5761E-10	25	65	0.2015	2.8107E-10
	10000	x6	7	68	0.0931	6.7220E-10	18	75	0.1857	3.2066E-10	14	59	0.1592	7.4857E-10	12	75	0.1458	1.7835E-10	25	65	0.1945	2.8107E-10
	10000	x7	8	77	0.0831	6.7568E-11	18	75	0.2166	4.4268E-10	15	63	0.1842	2.0671E-10	12	75	0.1825	2.4574E-10	32	90	0.2678	3.4574E-10
	50000	x1	18	140	0.6215	1.3652E-10	20	80	0.6880	9.9035E-10	17	68	0.6010	9.5368E-10	41	246	1.5880	4.9668E-10	37	143	1.1555	1.1615E-10
	50000	x2	14	120	0.5116	9.7077E-11	22	83	0.7695	7.0603E-10	19	71	0.6784	4.9492E-10	36	214	1.4285	5.8921E-10	28	96	0.8839	1.2672E-10
	50000	x3	11	97	0.4185	1.8664E-10	19	77	0.6892	3.3823E-10	16	65	0.6053	2.0460E-10	46	277	1.7402	5.9178E-10	25	62	0.5930	9.0825E-11
	50000	x4	9	84	0.3563	6.8865E-11	19	78	0.7025	2.7240E-10	15	62	0.5902	7.8935E-10	12	74	0.5339	8.2999E-10	-	-	-	-
	50000	x5	8	76	0.3189	1.8481E-10	19	78	0.6919	3.2788E-10	16	67	0.5839	3.0498E-10	13	81	0.5620	3.5243E-10	-	-	-	-
	50000	x6	8	77	0.3394	5.8774E-11	18	75	0.6311	7.1702E-10	15	63	0.5374	2.9816E-10	12	75	0.5493	3.9881E-10	-	-	-	-
	50000	x7	8	77	0.3189	1.5109E-10	18	75	0.6410	9.8986E-10	15	63	0.5485	4.6221E-10	12	75	0.5373	5.4950E-10	30	96	0.8895	6.1932E-10
	100000	x1	16	123	1.0857	6.7195E-10	21	84	1.3598	3.3826E-10	18	72	1.2023	2.4024E-10	41	246	3.0699	6.9536E-10	-	-	-	-
	100000	x2	18	142	1.2640	1.3096E-10	22	83	1.3154	9.9922E-10	19	71	1.1882	6.9992E-10	36	214	2.6861	8.6321E-10	22	53	1.0222	9.8507E-10
	100000	x3	11	97	0.8169	2.6621E-10	19	77	1.3026	4.7841E-10	16	65	1.0568	2.8934E-10	46	277	3.4342	8.4221E-10	-	-	-	-
	100000	x4	9	84	0.7042	9.7391E-11	19	78	1.3127	3.8523E-10	16	66	1.0834	1.9884E-10	13	80	1.0845	1.3678E-10	40	168	2.8538	5.6969E-10
	100000	x5	8	76	0.6754	2.6136E-10	19	78	1.2110	4.6369E-10	16	67	1.0526	4.3131E-10	13	81	1.0744	4.9842E-10	-	-	-	-
	100000	x6	8	77	0.6598	8.3119E-11	19	79	1.2648	2.4469E-10	15	63	1.0647	4.2167E-10	12	75	1.0145	5.6400E-10	-	-	-	-
	100000	x7	8	77	0.6653	2.1367E-10	19	79	1.2991	3.3779E-10	15	63	1.0608	6.5366E-10	12	75	1.0147	7.7711E-10	33	153	2.3157	9.2067E-10