

A Greedy Randomized Adaptive Search Procedure with Fast Vertex Substitution for the α -Neighbor k -Supplier Problem

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D Detailed Computational Results

D.1 GRASP assessment

The tables in this section report the following values:

- **v** : instance variation.
- **k** : number of facilities to open.
- **α** : level of admissible proximity between customers and facilities.
- **RGD**: objective value of the best construction-phase solution.
- **α -FVS**: objective value of the best locally improved solution.
- **RI**: relative improvement as described in Section 5.5.
- **RI_{min}**, **RI_{max}**, and **RI_{avg}**: minimum, maximum, and average relative improvements achieved by the local search with respect to the construction-phase solution over all GRASP iterations.
- **Time**: computational time of the two phases.
- **i_{last}** : iteration in which the last improvement was found.

Table 10: Detailed computational results for GRASP on instance **pr439-293-146**.

v	k	α	RGD	$z(S)$ α -FVS	RI (%)	α -FVS RI (%)			Time (s)	i_{last}
						RI _{min}	RI _{max}	RI _{avg}		
0	7	2	4639.10	3868.22	16.62	11.10	41.40	28.58	4.48	1
		3	5929.64	5433.29	8.37	1.12	36.14	17.10	6.95	54
	14	2	3222.19	2719.49	15.60	0.00	36.87	18.91	2.12	9
		3	4141.93	3401.47	17.88	8.57	34.98	17.28	4.17	40
	21	2	2620.23	2620.23	0.00	0.00	40.46	13.29	0.94	0
		3	3222.19	3222.19	0.00	0.00	27.34	15.11	1.04	0
1	7	2	4620.88	4203.64	9.03	9.03	32.97	23.84	2.82	0
		3	6230.77	5204.93	16.46	7.41	39.94	21.10	7.58	0
	14	2	3506.16	2793.97	20.31	13.86	42.58	30.20	2.83	1
		3	4203.64	3630.17	13.64	4.28	32.40	23.17	4.65	11
	21	2	3506.16	2713.97	22.59	22.59	42.64	28.41	0.74	0
		3	4203.64	3506.16	16.59	16.59	30.05	21.00	0.93	0
2	7	2	4619.12	4201.19	9.05	8.10	36.51	21.55	4.49	2
		3	6039.97	5330.40	11.75	3.45	40.61	21.14	7.08	0
	14	2	3326.41	2893.53	13.01	6.34	40.79	23.91	4.38	73
		3	4250.00	3586.26	15.62	6.78	28.21	23.34	4.47	1
	21	2	3088.69	2570.63	16.77	16.77	29.65	26.72	1.06	0
		3	3654.19	2986.85	18.26	14.74	35.89	20.50	2.88	0
3	7	2	4468.78	4201.19	5.99	5.99	36.97	20.85	2.55	0
		3	6285.15	5380.81	14.39	1.41	36.63	20.85	7.53	8
	14	2	3277.38	2773.54	15.37	7.20	42.17	22.83	3.02	6
		3	4153.46	3534.92	14.89	1.33	37.17	20.16	6.60	38
	21	2	2840.88	2277.20	19.84	15.22	36.73	27.41	2.01	0
		3	4153.46	2815.25	32.22	23.66	42.20	32.31	3.66	16
4	7	2	5087.05	4225.67	16.93	8.85	39.43	26.52	4.44	0
		3	6166.54	5339.77	13.41	0.75	41.14	17.51	4.95	3
	14	2	3794.90	3450.09	9.09	9.09	36.18	20.68	0.98	0
		3	4632.49	3757.08	18.90	18.62	34.00	28.52	3.48	0
	21	2	3745.16	3450.09	7.88	7.88	26.65	15.03	0.55	0
		3	4201.19	3498.66	16.72	16.72	31.99	21.58	1.72	0
5	7	2	4995.81	4250.29	14.92	7.95	34.66	21.54	4.07	1
		3	6364.80	5087.05	20.08	6.40	39.96	23.52	7.64	0
	14	2	4310.23	2719.49	36.91	27.53	45.56	36.97	3.82	46
		3	4995.81	4250.29	14.92	14.92	26.25	16.49	2.82	0
	21	2	4250.29	2719.49	36.02	36.02	45.56	41.18	0.87	0
		3	4366.06	4250.29	2.65	2.65	18.29	13.91	1.45	0

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v	k	α	$z(S)$			α -FVS RI (%)			Time (s)	i_{last}
			RGD	α -FVS	RI (%)	RI _{min}	RI _{max}	RI _{avg}		
6	7	2	5087.05	4025.08	20.88	5.19	35.44	24.08	5.15	0
		3	5979.39	5064.15	15.31	2.26	40.91	18.96	4.61	0
	14	2	3530.23	3115.39	11.75	11.75	33.17	23.60	1.72	0
		3	4450.42	3588.35	19.37	11.07	37.77	22.83	4.47	2
	21	2	3390.06	3115.39	8.10	8.10	31.39	17.25	0.31	0
		3	3701.77	3260.75	11.91	11.91	34.94	24.59	1.37	0
7	7	2	4688.88	4201.19	10.40	9.72	42.27	25.22	3.67	1
		3	6125.05	5235.04	14.53	9.30	38.90	22.00	8.43	1
	14	2	3599.05	3070.02	14.70	7.54	41.36	19.31	1.77	0
		3	4600.27	3650.34	20.65	8.68	40.23	23.48	3.50	0
	21	2	3070.02	3070.02	0.00	0.00	18.03	10.03	0.28	0
		3	4201.19	3315.97	21.07	18.30	35.94	25.11	2.01	0
8	7	2	5151.27	4003.83	22.27	10.24	38.48	25.43	4.21	6
		3	5896.19	5223.56	11.41	2.90	36.66	18.46	9.65	37
	14	2	3122.70	2775.11	11.13	1.69	26.72	15.58	2.24	11
		3	4236.52	3482.81	17.79	11.25	35.37	23.99	5.17	11
	21	2	2580.94	2452.04	4.99	4.99	31.68	18.35	1.37	0
		3	3115.39	3070.02	1.46	1.46	40.18	22.55	1.03	0
9	7	2	5279.80	4339.14	17.82	14.12	36.67	22.27	2.93	0
		3	6029.93	5318.19	11.80	0.00	32.77	13.67	4.57	28
	14	2	2960.15	2726.03	7.91	4.03	42.96	22.95	5.10	52
		3	4311.39	3473.11	19.44	18.16	34.49	28.03	3.67	5
	21	2	2719.49	2095.38	22.95	9.83	39.76	27.28	3.58	7
		3	3482.81	2735.42	21.46	13.86	46.42	27.99	6.23	27

Table 11: Detailed computational results for GRASP on instance **rat575-384-191**.

v	k	α	$z(S)$			α -FVS RI (%)			Time (s)	i_{last}
			RGD	α -FVS	RI (%)	RI _{min}	RI _{max}	RI _{avg}		
0	9	2	149.09	128.41	13.87	8.44	39.68	25.44	16.52	85
		3	187.26	152.50	18.56	7.41	34.00	20.14	26.48	99
	19	2	101.65	78.92	22.36	3.84	47.13	30.53	15.29	65
		3	129.85	106.30	18.14	3.10	38.62	21.89	12.19	26
	28	2	76.00	64.78	14.76	2.59	49.05	29.39	14.43	94
		3	100.65	80.95	19.57	4.91	43.47	29.83	13.40	1
1	9	2	146.24	125.88	13.92	1.66	43.37	25.90	16.88	90
		3	187.58	154.46	17.66	8.10	41.84	25.19	26.80	81
	19	2	92.00	80.95	12.01	2.85	43.30	24.42	9.04	38
		3	125.88	101.32	19.51	5.27	41.91	22.67	22.60	97
	28	2	77.42	66.04	14.70	0.51	41.34	22.78	9.52	34
		3	96.77	81.04	16.26	9.48	45.84	26.40	15.09	54
2	9	2	148.08	122.49	17.28	3.63	42.48	24.22	12.85	47
		3	186.10	151.21	18.75	8.68	40.09	25.48	32.75	128
	19	2	97.58	78.01	20.06	0.30	41.63	23.74	11.69	59
		3	122.02	103.28	15.36	6.96	36.44	20.64	15.03	57
	28	2	80.21	66.07	17.63	10.50	47.92	29.08	11.17	64
		3	98.00	81.54	16.80	8.56	40.82	25.26	18.09	62
3	9	2	149.03	123.58	17.08	10.46	40.78	27.74	8.27	4
		3	189.50	153.44	19.03	6.16	33.40	23.64	15.00	0
	19	2	92.63	79.65	14.01	0.64	44.97	23.78	10.60	47
		3	119.82	99.13	17.27	0.93	39.68	21.03	27.03	178
	28	2	74.63	64.44	13.65	0.00	40.94	23.38	8.26	22
		3	97.42	79.88	18.00	3.42	41.70	23.60	18.45	87
4	9	2	149.86	128.86	14.01	9.49	42.37	22.76	10.72	54
		3	190.06	152.63	19.69	8.79	36.94	26.79	17.34	4
	19	2	97.01	77.28	20.34	4.23	43.28	25.48	14.82	102
		3	120.04	103.32	13.93	1.64	36.46	21.04	8.40	1
	28	2	77.18	64.50	16.43	7.27	42.37	26.35	11.16	73
		3	96.17	79.65	17.18	4.73	40.50	23.53	17.69	82
5	9	2	157.05	124.04	21.02	12.50	41.40	28.28	9.01	1
		3	193.02	152.27	21.11	5.92	35.27	23.13	20.85	47
	19	2	92.31	77.83	15.69	2.93	44.80	21.87	14.08	81
		3	120.15	101.02	15.92	2.27	39.22	20.91	13.59	45

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v	k	α	$z(S)$			α -FVS RI (%)			Time (s)	i_{last}
			RGD	α -FVS	RI (%)	RI _{min}	RI _{max}	RI _{avg}		
6	28	2	75.24	64.66	14.06	5.94	45.05	26.32	10.53	48
		3	97.75	79.81	18.35	3.36	39.04	23.35	17.50	56
	9	2	153.57	126.00	17.95	10.02	39.11	24.86	11.13	16
		3	186.03	152.88	17.82	0.00	42.28	23.37	32.92	108
	19	2	98.95	81.06	18.08	0.57	42.52	26.29	9.07	8
		3	123.69	105.91	14.37	4.17	35.52	20.84	10.23	19
	28	2	78.26	64.63	17.42	5.13	41.30	25.19	13.91	88
		3	99.81	81.06	18.79	5.07	39.59	23.64	17.01	41
	9	2	147.27	127.91	13.15	5.67	39.91	21.22	10.80	62
		3	186.95	151.49	18.97	2.27	36.66	27.85	22.05	48
	19	2	95.34	77.99	18.20	0.78	46.84	23.72	23.11	196
		3	123.07	98.98	19.57	0.00	34.87	21.51	13.20	39
7	28	2	80.62	65.28	19.03	7.83	41.80	24.06	11.27	68
		3	97.49	81.39	16.51	0.00	44.98	22.82	12.02	4
	9	2	149.09	126.91	14.88	3.18	42.58	24.69	10.03	11
		3	193.01	153.73	20.35	1.90	39.07	24.78	18.61	31
	19	2	94.54	80.45	14.90	5.30	43.52	24.38	9.10	20
		3	119.62	104.24	12.86	3.54	38.21	20.74	10.90	29
	28	2	82.02	67.42	17.80	1.69	39.35	24.77	7.46	12
		3	102.18	82.07	19.68	7.28	39.79	23.55	14.83	34
	9	2	144.01	125.72	12.70	5.75	43.32	23.84	15.71	102
		3	190.94	152.63	20.06	10.57	38.63	27.64	27.79	121
	19	2	95.80	78.01	18.57	2.06	48.50	26.23	12.09	55
		3	120.07	101.32	15.62	4.32	36.80	22.13	13.87	49
	28	2	80.08	64.29	19.72	6.91	50.55	23.62	8.39	17
		3	97.75	77.99	20.21	3.59	40.70	24.98	23.51	114

Table 12: Detailed computational results for GRASP on instance **rat783-522-261**.

v	k	α	$z(S)$			α -FVS RI (%)			Time (s)	i_{last}
			RGD	α -FVS	RI (%)	RI _{min}	RI _{max}	RI _{avg}		
0	13	2	140.43	118.80	15.40	2.28	41.66	23.11	14.55	12
		3	188.00	150.21	20.10	12.08	39.15	25.05	25.05	3
	26	2	94.40	78.10	17.27	6.03	47.17	29.32	19.32	29
		3	127.56	95.34	25.26	4.24	43.07	27.84	47.15	91
	39	2	77.62	64.28	17.19	0.01	48.93	27.70	36.74	205
		3	97.02	77.47	20.15	3.09	45.60	29.40	45.32	129
1	13	2	138.05	115.75	16.15	0.00	42.49	21.01	26.89	86
		3	177.34	148.71	16.14	5.52	37.71	21.19	34.70	49
	26	2	95.52	77.88	18.47	4.93	45.36	22.69	30.98	124
		3	119.85	97.35	18.77	8.16	42.75	25.28	33.42	36
	39	2	76.22	64.14	15.85	3.98	46.47	24.07	22.73	90
		3	94.02	79.40	15.55	0.00	39.27	22.07	30.24	61
2	13	2	142.20	115.32	18.90	2.32	37.30	20.76	13.89	1
		3	183.99	154.24	16.17	7.88	36.89	24.46	25.41	1
	26	2	93.54	79.31	15.21	0.84	44.57	25.79	42.16	183
		3	120.04	99.46	17.14	0.00	40.35	24.72	40.18	76
	39	2	81.93	63.89	22.02	3.87	47.33	26.06	19.18	44
		3	98.23	80.02	18.54	4.41	40.58	25.07	37.51	107
3	13	2	134.30	113.45	15.52	0.00	40.96	20.86	25.01	73
		3	175.33	150.00	14.45	8.31	40.83	21.53	29.94	15
	26	2	94.89	78.45	17.33	5.21	38.68	23.34	31.67	140
		3	120.42	96.90	19.53	4.17	43.48	23.25	62.83	156
	39	2	74.69	64.82	13.21	0.00	43.52	23.10	20.62	87
		3	93.21	79.65	14.55	8.18	40.73	22.87	23.78	34
4	13	2	138.22	113.14	18.14	1.04	54.23	21.07	33.45	117
		3	176.34	151.60	14.03	4.64	38.39	21.67	30.58	19
	26	2	95.19	79.16	16.84	3.03	49.57	25.64	25.87	80
		3	122.59	95.52	22.08	3.98	42.15	24.72	37.08	34
	39	2	72.40	63.64	12.10	0.00	42.91	21.69	18.25	57
		3	96.34	79.56	17.42	5.29	42.09	25.14	24.10	21
13	3	2	142.41	114.59	19.54	3.44	43.34	22.86	23.98	64
		3	181.04	149.05	17.67	5.59	40.45	25.57	41.85	55

v	k	α	$z(S)$			α -FVS RI (%)			Time (s)	i_{last}
			RGD	α -FVS	RI (%)	RI _{min}	RI _{max}	RI _{avg}		
	26	2	92.85	79.92	13.93	4.41	44.25	23.61	30.65	112
		3	120.74	96.57	20.02	4.27	42.52	26.61	48.39	101
	39	2	74.40	63.25	14.99	0.00	40.43	22.49	13.93	20
		3	95.60	80.32	15.98	0.25	45.08	25.87	22.97	27
	13	2	140.53	119.92	14.67	6.42	41.48	21.40	19.97	41
		3	173.98	152.27	12.48	5.85	38.07	22.67	41.29	63
6	26	2	94.67	79.40	16.13	5.49	40.19	22.98	20.07	44
		3	121.02	94.85	21.62	3.84	42.20	24.41	46.64	96
	39	2	77.01	64.01	16.88	2.65	41.86	21.57	15.80	46
		3	94.37	79.40	15.86	3.75	42.73	21.65	19.66	10
	13	2	141.23	115.32	18.35	1.06	42.42	22.43	15.55	8
		3	171.33	150.08	12.40	0.00	39.11	23.34	73.60	180
7	26	2	95.34	78.55	17.61	7.17	44.71	25.65	27.09	102
		3	121.92	97.42	20.10	5.59	41.74	24.70	43.52	80
	39	2	78.77	64.40	18.24	9.79	49.89	26.29	14.80	16
		3	93.41	79.00	15.43	7.08	41.92	25.13	23.97	19
	13	2	142.79	118.70	16.87	0.21	40.37	19.64	18.46	40
		3	177.18	152.71	13.81	4.05	36.29	22.11	42.87	106
8	26	2	94.92	80.13	15.58	6.29	40.05	22.45	15.56	6
		3	118.61	95.80	19.23	4.19	41.51	25.23	59.64	135
	39	2	78.45	64.20	18.16	3.94	44.52	22.51	20.08	75
		3	95.80	79.25	17.28	0.00	40.80	22.83	24.95	42
	13	2	142.80	114.04	20.14	4.81	42.23	23.11	24.01	34
		3	175.52	150.27	14.39	9.95	35.64	24.32	28.30	6
9	26	2	88.24	81.01	8.19	0.89	46.92	23.37	36.96	143
		3	117.46	97.35	17.12	6.11	37.52	21.07	30.12	28
	39	2	76.06	63.60	16.38	1.30	40.28	21.62	13.31	5
		3	93.48	80.50	13.89	4.68	37.30	22.67	43.89	110

Table 13: Detailed computational results for GRASP on instance **dsj1000-667-333**.

v	k	α	$z(S)$			α -FVS RI (%)			Time (s)	i_{last}
			RGD	α -FVS	RI (%)	RI _{min}	RI _{max}	RI _{avg}		
0	16	2	317722.63	240066.05	24.44	11.01	53.14	34.06	31.64	54
		3	414273.97	333175.62	19.58	9.45	41.84	26.82	23.71	23
	33	2	201042.14	135457.30	32.62	22.81	59.97	42.10	29.80	9
		3	276398.50	194438.73	29.65	23.39	51.95	40.62	53.29	19
	49	2	151561.92	119987.65	20.83	14.99	59.45	35.77	28.43	1
		3	197286.80	138355.34	29.87	20.46	59.88	40.38	51.56	10
1	16	2	324294.12	232985.63	28.16	17.82	57.25	40.93	28.67	5
		3	421714.86	341431.19	19.04	16.04	44.37	33.71	29.95	4
	33	2	207394.45	139507.20	32.73	26.07	67.07	41.19	44.04	3
		3	250115.70	191870.82	23.29	12.66	58.83	34.21	72.09	83
	49	2	175146.46	129112.08	26.28	26.28	55.10	38.51	23.88	0
		3	208811.12	140168.10	32.87	22.90	50.13	38.92	65.17	26
2	16	2	297489.84	236945.60	20.35	4.87	46.65	28.42	34.95	95
		3	413568.67	319531.69	22.74	6.95	40.88	27.21	47.49	94
	33	2	204647.90	138021.94	32.56	20.90	58.95	39.53	53.63	80
		3	257292.01	193633.43	24.74	19.16	53.86	35.63	44.99	11
	49	2	187362.75	117945.27	37.05	34.08	60.65	43.38	45.72	22
		3	213659.67	138432.92	35.21	27.28	54.73	40.35	79.00	58
3	16	2	322422.87	243199.05	24.57	11.23	52.06	32.59	18.87	10
		3	419160.94	319571.06	23.76	18.68	45.26	30.44	36.01	3
	33	2	195791.63	143470.60	26.72	18.83	52.09	36.81	39.22	41
		3	260804.21	191358.20	26.63	16.82	56.29	34.22	95.23	105
	49	2	160672.68	115674.83	28.01	23.47	50.44	37.76	42.08	24
		3	208439.19	150629.08	27.73	22.19	52.31	33.80	86.23	96
4	16	2	311777.34	241105.98	22.67	7.31	54.19	32.20	49.17	118
		3	424396.40	315894.05	25.57	13.70	39.62	29.51	34.88	16
	33	2	199041.84	140941.96	29.19	17.68	58.07	42.38	33.33	1
		3	274259.81	198610.49	27.58	20.97	52.83	36.08	78.41	104
	49	2	157166.92	126368.46	19.60	15.90	53.12	32.98	26.82	1
		3	201160.28	146628.79	27.11	24.52	55.69	39.86	59.41	8

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v	k	α	$z(S)$			α -FVS RI (%)			Time (s)	i_{last}
			RGD	α -FVS	RI (%)	RI _{min}	RI _{max}	RI _{avg}		
5	16	2	303708.48	234630.93	22.74	4.43	50.17	25.58	37.45	98
		3	406226.80	327486.33	19.38	11.63	35.15	24.21	39.83	16
	33	2	203311.47	135858.26	33.18	15.54	56.30	36.79	37.65	2
		3	257457.34	189368.16	26.45	14.42	51.24	32.87	41.98	1
	49	2	152078.77	117945.27	22.44	17.25	55.76	35.52	66.11	117
		3	197312.65	139789.17	29.15	17.60	59.31	35.25	68.63	48
6	16	2	294681.69	235038.32	20.24	5.72	45.45	28.38	47.23	102
		3	398470.90	301402.61	24.36	12.30	44.21	29.56	33.72	8
	33	2	183456.93	136983.75	25.33	19.97	49.98	33.74	43.49	18
		3	243075.30	199317.72	18.00	5.04	50.47	25.11	36.62	11
	49	2	141419.94	115514.89	18.32	11.33	47.73	35.61	54.49	75
		3	206855.54	141611.36	31.54	18.75	49.32	30.57	93.60	84
7	16	2	310978.18	232298.74	25.30	12.81	55.27	35.98	46.80	95
		3	412272.16	324330.11	21.33	12.25	46.35	33.35	41.94	14
	33	2	187172.42	140762.11	24.80	14.50	49.61	35.35	35.11	5
		3	250679.76	193623.67	22.76	12.11	50.38	27.60	62.32	52
	49	2	177707.48	118490.08	33.32	28.02	53.05	37.80	39.23	6
		3	208439.19	142573.65	31.60	19.75	49.54	35.27	67.75	36
8	16	2	323131.47	237927.13	26.37	9.27	43.93	29.52	20.31	1
		3	394960.18	307951.03	22.03	6.26	39.06	23.29	26.10	22
	33	2	186754.31	139697.18	25.20	9.85	50.03	34.67	42.25	17
		3	243052.83	185650.43	23.62	12.46	52.12	31.95	47.65	16
	49	2	162229.09	115425.17	28.85	20.28	52.59	34.89	31.66	4
		3	185801.78	142746.12	23.17	14.89	47.78	32.49	82.78	50
9	16	2	313460.74	242757.53	22.56	12.87	50.36	31.54	37.97	72
		3	396323.07	319233.80	19.45	11.67	43.29	30.94	49.80	48
	33	2	206855.54	143101.98	30.82	20.96	52.01	38.06	34.99	2
		3	257474.16	194134.24	24.60	11.57	48.17	30.44	45.57	7
	49	2	156446.76	118877.37	24.01	16.86	48.24	35.66	45.87	78
		3	209228.05	143101.98	31.60	24.52	52.01	38.77	59.20	13

Table 14: Detailed computational results for GRASP on instance **r11323-882-441**.

v	k	α	$z(S)$			α -FVS RI (%)			Time (s)	i_{last}
			RGD	α -FVS	RI (%)	RI _{min}	RI _{max}	RI _{avg}		
0	22	2	4256.91	3433.83	19.34	17.90	42.49	28.44	35.15	2
		3	4957.96	3972.91	19.87	12.70	41.74	28.09	85.06	36
	44	2	3852.73	3433.83	10.87	10.87	31.94	20.53	2.00	0
		3	3972.91	3547.20	10.72	10.72	38.40	26.22	8.18	0
	66	2	3648.61	3433.83	5.89	5.89	28.03	16.90	1.48	0
		3	3908.29	3547.20	9.24	9.24	29.70	20.43	3.27	0
1	22	2	4044.92	3124.04	22.77	18.86	41.25	33.02	61.85	2
		3	4931.40	3808.14	22.78	10.79	39.84	26.00	171.47	155
	44	2	3124.04	3124.04	0.00	0.00	29.93	11.74	1.43	0
		3	3858.75	3364.76	12.80	12.80	33.45	23.28	8.94	0
	66	2	3124.04	3124.04	0.00	0.00	17.19	5.82	0.59	0
		3	3535.21	3364.76	4.82	4.82	29.68	14.49	2.15	0
2	22	2	3878.54	3078.87	20.62	14.79	50.56	30.36	62.05	2
		3	4684.79	3949.72	15.69	10.85	40.98	24.66	87.61	3
	44	2	2751.91	2751.91	0.00	0.00	32.29	11.89	4.14	0
		3	3236.00	2869.67	11.32	11.32	40.89	24.92	43.21	0
	66	2	2751.91	2751.91	0.00	0.00	15.89	3.56	0.68	0
		3	2869.67	2869.67	0.00	0.00	28.10	11.95	3.28	0
3	22	2	4157.97	3474.85	16.43	4.61	43.98	28.17	32.15	1
		3	4888.65	3918.27	19.85	11.97	35.96	25.81	77.27	24
	44	2	3648.61	3474.85	4.76	4.76	27.63	13.73	2.26	0
		3	3958.99	3550.31	10.32	10.32	30.73	19.50	8.54	0
	66	2	3648.61	3474.85	4.76	4.76	20.82	12.24	1.80	0
		3	3918.27	3550.31	9.39	9.39	26.15	15.72	4.69	0
4	22	2	3932.13	3043.22	22.61	15.36	48.65	32.94	61.64	21
		3	4828.84	3907.83	19.07	13.23	41.14	28.51	95.78	33
	44	2	2786.48	2579.84	7.42	7.42	38.01	25.39	7.66	0
		3	3958.99	3289.91	16.90	15.94	37.89	23.45	11.63	0

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v	k	α	$z(S)$			α -FVS RI (%)			Time (s)	i_{last}
			RGD	α -FVS	RI (%)	RI _{min}	RI _{max}	RI _{avg}		
5	66	2	2579.84	2579.84	0.00	0.00	29.86	12.01	1.19	0
		3	3447.96	3289.91	4.58	4.58	27.08	16.40	2.38	0
	22	2	3899.70	3208.41	17.73	10.38	42.38	29.12	58.55	1
		3	4736.00	3852.73	18.65	9.91	46.34	27.16	155.22	123
	44	2	3233.40	2066.85	36.08	24.35	51.62	38.47	75.91	26
		3	3630.04	3233.40	10.93	9.63	39.79	25.78	16.60	0
	66	2	3233.40	2021.87	37.47	37.47	52.61	41.45	12.64	0
		3	3630.04	3233.40	10.93	10.93	32.28	19.21	3.90	0
	22	2	3853.22	3001.30	22.11	3.47	51.83	30.62	177.57	144
		3	4765.25	3960.13	16.90	10.04	44.03	26.60	77.66	0
	44	2	2790.63	2068.65	25.87	16.36	48.54	36.67	69.66	21
		3	3543.07	2618.78	26.09	14.06	43.35	32.75	151.46	74
6	66	2	2488.73	2021.87	18.76	11.73	44.30	31.94	12.07	0
		3	3275.40	2488.73	24.02	22.12	41.94	31.23	20.43	0
	22	2	4042.37	3531.41	12.64	12.64	36.93	27.16	29.11	0
		3	4788.03	3832.99	19.95	10.61	40.56	25.20	143.47	137
	44	2	3631.15	3531.41	2.75	2.75	26.03	14.02	2.03	0
		3	4067.65	3550.31	12.72	12.72	35.39	21.85	10.50	0
	66	2	3550.31	3531.41	0.53	0.53	26.03	10.65	1.52	0
		3	3960.13	3550.31	10.35	10.35	26.61	16.60	4.41	0
	22	2	3911.49	3017.09	22.87	9.85	40.60	29.60	86.29	38
		3	4928.79	3810.84	22.68	11.93	44.56	24.93	92.59	40
	44	2	2966.39	2948.00	0.62	0.62	39.49	15.76	3.96	0
		3	3572.49	3124.04	12.55	12.55	38.23	26.55	21.63	0
7	66	2	2948.00	2948.00	0.00	0.00	18.57	7.17	0.84	0
		3	3471.89	3124.04	10.02	10.02	31.49	18.43	4.21	0
	22	2	3671.85	3129.96	14.76	6.93	46.54	30.42	64.23	36
		3	4828.84	3809.59	21.11	10.15	42.32	29.25	152.09	82
	44	2	2948.00	2074.46	29.63	17.01	44.99	34.49	91.41	59
		3	3417.30	2948.00	13.73	13.73	44.19	26.40	43.29	0
	66	2	2948.00	1905.12	35.38	28.67	48.31	40.60	26.22	0
		3	3417.30	2948.00	13.73	13.73	27.79	18.97	8.20	0

Table 15: Detailed computational results for GRASP on instance r11889-1260-629.

v	k	α	$z(S)$			α -FVS RI (%)			Time (s)	i_{last}
			RGD	α -FVS	RI (%)	RI _{min}	RI _{max}	RI _{avg}		
0	31	2	2956.93	2566.01	13.22	7.46	37.51	21.99	169.96	24
		3	3799.50	3149.89	17.10	11.93	42.36	25.48	262.08	22
	62	2	2196.65	1770.22	19.41	4.34	40.00	24.48	368.46	192
		3	2659.57	2193.77	17.51	4.63	42.35	23.12	425.17	108
	94	2	1769.94	1394.09	21.24	11.25	48.10	31.06	252.38	122
		3	2293.05	1760.00	23.25	7.38	40.12	28.90	302.53	34
	31	2	3073.05	2525.83	17.81	10.83	40.27	26.65	172.09	20
		3	3790.28	3176.05	16.21	10.50	40.39	25.35	257.48	20
1	62	2	2254.03	1772.79	21.35	6.90	37.87	26.62	332.21	144
		3	2647.32	2204.04	16.74	1.42	47.61	24.00	227.05	20
	94	2	1862.12	1425.98	23.42	10.44	47.64	33.09	172.82	52
		3	2192.07	1756.36	19.88	13.30	37.41	27.85	364.62	104
	31	2	3086.72	2524.14	18.23	6.69	47.52	24.31	287.30	104
		3	3777.03	3153.32	16.51	6.47	42.89	25.44	511.85	170
	62	2	2282.55	1812.03	20.61	12.84	39.14	26.93	144.19	13
		3	2596.39	2222.61	14.40	8.18	39.06	24.44	229.49	24
2	94	2	1890.07	1403.18	25.76	16.89	44.58	31.88	221.28	83
		3	2282.55	1760.00	22.89	10.58	37.49	27.99	280.91	46
	31	2	3146.37	2542.96	19.18	11.95	48.91	27.19	188.48	32
		3	3858.10	3160.81	18.07	8.70	39.38	26.65	475.06	140
	62	2	2286.41	1820.53	20.38	9.92	45.96	25.20	153.21	23
		3	2517.72	2214.97	12.02	7.97	39.15	23.99	264.45	59
	94	2	1891.16	1414.26	25.22	15.29	48.74	34.08	183.15	54
		3	2355.04	1765.70	25.02	17.35	45.57	28.29	252.73	34
3	31	2	3030.89	2517.81	16.93	7.01	44.12	22.42	365.18	173
		3	3817.60	3173.80	16.86	9.63	40.39	25.54	288.62	51

v	k	α	$z(S)$			α -FVS RI (%)			Time (s)	i_{last}
			RGD	α -FVS	RI (%)	RI _{min}	RI _{max}	RI _{avg}		
	62	2	2189.19	1792.26	18.13	0.00	43.08	25.66	283.24	124
		3	2655.71	2262.50	14.81	11.45	40.30	27.85	197.85	6
	94	2	1760.40	1410.63	19.87	8.69	44.92	31.31	386.90	237
		3	2347.08	1767.83	24.68	11.29	46.84	28.95	320.51	89
	31	2	3088.63	2511.54	18.68	8.11	44.02	25.40	180.88	28
		3	3790.51	3167.30	16.44	7.16	43.42	27.05	314.35	53
5	62	2	2193.21	1789.79	18.39	10.31	36.93	26.61	170.40	30
		3	2721.28	2222.61	18.32	9.23	35.16	26.01	197.02	4
	94	2	1877.91	1396.20	25.65	10.55	46.27	32.29	244.43	123
		3	2222.61	1797.04	19.15	5.13	45.60	28.45	211.44	15
	31	2	3081.16	2509.10	18.57	7.94	41.88	23.44	186.30	26
		3	3724.12	3129.22	15.97	6.60	42.41	24.44	482.53	137
6	62	2	2206.84	1773.29	19.65	10.11	37.90	25.91	418.77	216
		3	2693.52	2208.06	18.02	11.91	37.75	22.66	379.98	101
	94	2	1993.86	1435.86	27.99	17.76	45.17	31.06	122.01	11
		3	2282.55	1773.29	22.31	8.80	42.45	28.34	206.80	12
	31	2	3065.30	2502.88	18.35	7.98	44.80	25.52	318.31	131
		3	3847.62	3204.76	16.71	11.07	41.68	26.93	190.56	4
7	62	2	2280.88	1762.84	22.71	8.72	44.76	26.92	213.60	65
		3	2709.83	2208.12	18.51	7.10	37.68	24.88	192.63	13
	94	2	1891.16	1418.96	24.97	12.92	50.44	31.08	260.66	134
		3	2383.97	1741.95	26.93	13.64	45.79	29.24	369.63	81
	31	2	2982.69	2525.83	15.32	4.71	45.64	24.63	220.47	56
		3	3770.68	3164.36	16.08	13.75	42.45	25.06	224.35	29
8	62	2	2277.59	1810.29	20.52	8.67	41.93	27.09	262.26	102
		3	2655.66	2218.77	16.45	11.07	45.45	28.13	331.69	105
	94	2	1818.28	1410.46	22.43	6.78	45.21	30.43	182.79	65
		3	2309.44	1773.70	23.20	14.84	50.08	28.95	361.32	93
	31	2	3153.75	2571.73	18.45	10.78	50.12	26.07	178.44	36
		3	3860.22	3195.52	17.22	13.07	41.69	26.78	213.64	4
9	62	2	2277.59	1818.28	20.17	13.18	38.60	27.04	141.62	22
		3	2728.88	2185.04	19.93	5.20	44.48	27.55	462.70	127
	94	2	1851.86	1430.19	22.77	13.60	48.17	32.41	211.99	96
		3	2391.66	1765.16	26.20	4.62	53.87	28.15	511.54	176

D.2 GRASP Against CPLEX

The tables in this section report the following values:

- v : instance variation.
- k : number of facilities to open.
- α : level of admissible proximity between customers and facilities.
- z^H : heuristic objective value.
- $\underline{z}$: best lower bound on the objective value returned by the solver.
- $\bar{z}$: best incumbent objective value found by the solver.
- $St.$: solver status, where O denotes optimal and F denotes feasible.
- Δ^H : relative deviation (in percentage) of the heuristic objective value from the best lower bound on the objective value obtained by the solver.

$$\Delta^H = 100 \cdot \frac{z^H - \underline{z}}{\underline{z}}.$$

- $\bar{z} - z^H$: absolute difference between the best incumbent objective value and the heuristic objective value.
- t^H (s): heuristic computation time.
- t^S (s): solver computation time.

Table 16: Computational results for GRASP against CPLEX without warm start on instance **pr439-293-146**.

v	k	α	z^H	$\underline{z}$	$\bar{z}$	St.	Δ^H	$\bar{z} - z^H$	t^H (s)	t^S (s)
0	7	2	3868.22	3868.05	3868.22	O	0.00	0.00	4.48	2581.77
		3	5433.29	3615.70	5727.13	F	50.27	293.84	6.95	7200.23
	14	2	2719.49	2719.49	2719.49	O	0.00	0.00	2.12	3986.22
		3	3401.47	3401.47	3401.47	O	0.00	0.00	4.17	877.62
	21	2	2620.23	2620.23	2620.23	O	0.00	0.00	0.94	53.17
		3	3222.19	3222.19	3222.19	O	0.00	0.00	1.04	1049.59
1	7	2	4203.64	2829.17	5948.11	F	48.58	1744.47	2.82	7200.09
		3	5204.93	3752.39	5681.16	F	38.71	476.23	7.58	7200.39
	14	2	2793.97	2793.97	2793.97	O	0.00	0.00	2.83	1350.53
		3	3630.17	3630.17	3630.17	O	0.00	0.00	4.65	2843.67
	21	2	2713.97	2713.97	2713.97	O	0.00	0.00	0.74	71.89
		3	3506.16	3506.16	3506.16	O	0.00	0.00	0.93	574.33
2	7	2	4201.19	4201.19	4201.19	O	0.00	0.00	4.49	4306.59
		3	5330.40	3694.80	5800.22	F	44.27	469.82	7.08	7199.27
	14	2	2893.53	2875.98	2875.98	O	0.61	-17.55	4.38	2241.06
		3	3586.26	3586.26	3586.26	O	0.00	0.00	4.47	2129.28
	21	2	2570.63	2570.63	2570.63	O	0.00	0.00	1.06	234.31
		3	2986.85	2986.85	2986.85	O	0.00	0.00	2.88	499.84
3	7	2	4201.19	4201.19	4201.19	O	0.00	0.00	2.55	2632.09
		3	5380.81	3648.70	6105.84	F	47.47	725.03	7.53	7198.48
	14	2	2773.54	2707.40	2707.40	O	2.44	-66.14	3.02	2549.42
		3	3534.92	3534.92	3534.92	O	0.00	0.00	6.60	2854.22
	21	2	2277.20	2277.20	2277.20	O	0.00	0.00	2.01	214.14
		3	2815.25	2761.91	2761.91	O	1.93	-53.34	3.66	3089.34
4	7	2	4225.67	3450.09	4955.11	F	22.48	729.44	4.44	7198.70
		3	5339.77	3799.08	5530.65	F	40.55	190.88	4.95	7199.64
	14	2	3450.09	3450.09	3450.09	O	0.00	0.00	0.98	1080.66
		3	3757.08	3757.08	3757.08	O	0.00	0.00	3.48	5358.08
	21	2	3450.09	3450.09	3450.09	O	0.00	0.00	0.55	49.92
		3	3498.66	3498.66	3498.66	O	0.00	0.00	1.72	562.70
5	7	2	4250.29	3010.74	5275.71	F	41.17	1025.42	4.07	7198.00
		3	5087.05	5087.05	5087.05	O	0.00	0.00	7.64	4214.34
	14	2	2719.49	2719.49	2719.49	O	0.00	0.00	3.82	1467.56
		3	4250.29	4250.29	4250.29	O	0.00	0.00	2.82	386.16
	21	2	2719.49	2719.49	2719.49	O	0.00	0.00	0.87	29.17
		3	4250.29	4250.29	4250.29	O	0.00	0.00	1.45	28.34
6	7	2	4025.08	4025.08	4025.08	O	0.00	0.00	5.15	5327.03
		3	5064.15	5064.15	5064.15	O	0.00	0.00	4.61	5956.09
	14	2	3115.39	3115.39	3115.39	O	0.00	0.00	1.72	276.69
		3	3588.35	3534.92	3534.92	O	1.51	-53.43	4.47	1395.45
	21	2	3115.39	3115.39	3115.39	O	0.00	0.00	0.31	25.38
		3	3260.75	3260.75	3260.75	O	0.00	0.00	1.37	104.98
7	7	2	4201.19	3158.50	5280.68	F	33.01	1079.49	3.67	7198.86
		3	5235.04	5235.04	5235.04	O	0.00	0.00	8.43	3203.83
	14	2	3070.02	3070.02	3070.02	O	0.00	0.00	1.77	475.03
		3	3650.34	3650.34	3650.34	O	0.00	0.00	3.50	2404.73
	21	2	3070.02	3070.02	3070.02	O	0.00	0.00	0.28	30.53
		3	3315.97	3315.97	3315.97	O	0.00	0.00	2.01	169.73
8	7	2	4003.83	4003.83	4003.83	O	0.00	0.00	4.21	6863.42
		3	5223.56	5223.56	5223.56	O	0.00	0.00	9.65	4536.09
	14	2	2775.11	2642.09	2642.09	O	5.03	-133.02	2.24	1274.95
		3	3482.81	3482.81	3482.81	O	0.00	0.00	5.17	845.25
	21	2	2452.04	2452.04	2452.04	O	0.00	0.00	1.37	396.06
		3	3070.02	3070.02	3070.02	O	0.00	0.00	1.03	97.62
9	7	2	4339.14	4339.14	4339.14	O	0.00	0.00	2.93	3595.72
		3	5318.19	5318.19	5318.19	O	0.00	0.00	4.57	4127.28
	14	2	2726.03	2565.39	2565.39	O	6.26	-160.64	5.10	1191.41
		3	3473.11	3473.11	3473.11	O	0.00	0.00	3.67	2527.83
	21	2	2095.38	2095.38	2095.38	O	0.00	0.00	3.58	407.30

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v	k	α	z^H	$\underline{z}$	$\bar{z}$	St.	Δ^H	$\bar{z} - z^H$	t^H (s)	t^S (s)
		3	2735.42	2713.97	2713.97	O	0.79	-21.45	6.23	480.38

Table 17: Computational results for GRASP against CPLEX with warm start on instance **pr439-293-146**.

v	k	α	z^H	$\underline{z}$	$\bar{z}$	St.	Δ^H	$\bar{z} - z^H$	t^H (s)	t^S (s)
0	7	2	3868.22	3868.22	3868.22	O	0.00	0.00	4.51	88.44
		3	5433.29	5433.29	5433.29	O	0.00	0.00	7.00	466.77
	14	2	2719.49	2719.49	2719.49	O	0.00	0.00	2.11	72.20
		3	3401.47	3401.47	3401.47	O	0.00	0.00	4.15	187.20
	21	2	2620.23	2620.23	2620.23	O	0.00	0.00	0.97	30.52
		3	3222.19	3222.19	3222.19	O	0.00	0.00	1.05	89.64
1	7	2	4203.64	4203.64	4203.64	O	0.00	0.00	2.80	116.38
		3	5204.93	5204.93	5204.93	O	0.00	0.00	7.64	209.97
	14	2	2793.97	2793.97	2793.97	O	0.00	0.00	2.88	35.78
		3	3630.17	3630.17	3630.17	O	0.00	0.00	4.73	163.52
	21	2	2713.97	2713.97	2713.97	O	0.00	0.00	0.74	6.97
		3	3506.16	3506.16	3506.16	O	0.00	0.00	0.93	80.06
2	7	2	4201.19	4201.19	4201.19	O	0.00	0.00	4.22	96.20
		3	5330.40	5330.40	5330.40	O	0.00	0.00	6.98	227.89
	14	2	2893.53	2875.98	2875.98	O	0.61	-17.55	4.20	70.92
		3	3586.26	3586.26	3586.26	O	0.00	0.00	4.44	81.95
	21	2	2570.63	2570.63	2570.63	O	0.00	0.00	1.07	52.98
		3	2986.85	2986.85	2986.85	O	0.00	0.00	2.80	100.52
3	7	2	4201.19	4201.19	4201.19	O	0.00	0.00	2.54	68.84
		3	5380.81	5380.81	5380.81	O	0.00	0.00	7.48	287.81
	14	2	2773.54	2707.40	2707.40	O	2.44	-66.14	3.05	72.50
		3	3534.92	3534.92	3534.92	O	0.00	0.00	6.58	114.81
	21	2	2277.20	2277.20	2277.20	O	0.00	0.00	2.06	39.00
		3	2815.25	2761.91	2761.91	O	1.93	-53.34	3.78	217.30
4	7	2	4225.67	4225.67	4225.67	O	0.00	0.00	4.51	144.77
		3	5339.77	5154.73	5154.73	O	3.59	-185.04	5.03	257.30
	14	2	3450.09	3450.09	3450.09	O	0.00	0.00	0.98	26.28
		3	3757.08	3757.08	3757.08	O	0.00	0.00	3.52	74.88
	21	2	3450.09	3450.09	3450.09	O	0.00	0.00	0.55	18.33
		3	3498.66	3498.66	3498.66	O	0.00	0.00	1.76	51.02
5	7	2	4250.29	4250.29	4250.29	O	0.00	0.00	4.21	115.27
		3	5087.05	5087.05	5087.05	O	0.00	0.00	7.75	201.42
	14	2	2719.49	2719.49	2719.49	O	0.00	0.00	3.88	47.03
		3	4250.29	4250.29	4250.29	O	0.00	0.00	2.85	114.95
	21	2	2719.49	2719.49	2719.49	O	0.00	0.00	0.88	20.53
		3	4250.29	4250.29	4250.29	O	0.00	0.00	1.47	19.88
6	7	2	4025.08	4025.08	4025.08	O	0.00	0.00	5.19	146.67
		3	5064.15	5064.15	5064.15	O	0.00	0.00	4.43	201.12
	14	2	3115.39	3115.39	3115.39	O	0.00	0.00	1.74	10.06
		3	3588.35	3534.92	3534.92	O	1.51	-53.43	4.52	180.50
	21	2	3115.39	3115.39	3115.39	O	0.00	0.00	0.31	8.08
		3	3260.75	3260.75	3260.75	O	0.00	0.00	1.40	41.70
7	7	2	4201.19	4201.19	4201.19	O	0.00	0.00	3.71	91.41
		3	5235.04	5235.04	5235.04	O	0.00	0.00	8.87	198.36
	14	2	3070.02	3070.02	3070.02	O	0.00	0.00	1.82	44.30
		3	3650.34	3650.34	3650.34	O	0.00	0.00	3.51	248.52
	21	2	3070.02	3070.02	3070.02	O	0.00	0.00	0.28	30.05
		3	3315.97	3315.97	3315.97	O	0.00	0.00	2.03	78.83
8	7	2	4003.83	4003.83	4003.83	O	0.00	0.00	4.22	66.41
		3	5223.56	5223.56	5223.56	O	0.00	0.00	9.61	208.91
	14	2	2775.11	2642.09	2642.09	O	5.03	-133.02	2.24	71.86
		3	3482.81	3482.81	3482.81	O	0.00	0.00	5.20	154.53
	21	2	2452.04	2452.04	2452.04	O	0.00	0.00	1.37	35.72
		3								

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v	k	α	z^H	$\underline{z}$	$\bar{z}$	St.	Δ^H	$\bar{z} - z^H$	t^H (s)	t^S (s)
	3		3070.02	3070.02	3070.02	O	0.00	0.00	1.04	88.00
9	7	2	4339.14	4339.14	4339.14	O	0.00	0.00	2.91	86.77
		3	5318.19	5318.19	5318.19	O	0.00	0.00	4.61	183.83
	14	2	2726.03	2565.39	2565.39	O	6.26	-160.64	5.14	61.62
		3	3473.11	3473.11	3473.11	O	0.00	0.00	3.72	116.22
	21	2	2095.38	2095.38	2095.38	O	0.00	0.00	3.62	40.02
		3	2735.42	2713.97	2713.97	O	0.79	-21.45	6.25	110.77

Table 18: Computational results for GRASP against CPLEX without warm start on instance **rat575-384-191**.

v	k	α	z^H	$\underline{z}$	$\bar{z}$	St.	Δ^H	$\bar{z} - z^H$	t^H (s)	t^S (s)
0	9	2	128.41	83.04	199.25	F	54.63	70.84	16.52	7200.14
		3	152.50	113.40	248.28	F	34.48	95.78	26.48	7200.64
	19	2	78.92	51.43	104.12	F	53.45	25.20	15.29	7200.81
		3	106.30	66.64	137.46	F	59.52	31.16	12.19	7200.48
	28	2	64.78	45.66	71.69	F	41.88	6.91	14.43	7199.89
		3	80.95	52.06	147.73	F	55.50	66.78	13.40	7200.50
1	9	2	125.88	82.75	189.52	F	52.13	63.64	16.88	7199.41
		3	154.46	113.05	201.38	F	36.63	46.92	26.80	7199.31
	19	2	80.95	57.49	103.25	F	40.80	22.30	9.04	7192.56
		3	101.32	66.55	169.19	F	52.24	67.87	22.60	7199.08
	28	2	66.04	44.41	80.62	F	48.71	14.58	9.52	7198.61
		3	81.04	52.04	121.81	F	55.72	40.77	15.09	7199.25
2	9	2	122.49	84.01	133.69	F	45.80	11.20	12.85	7199.62
		3	151.21	112.70	237.54	F	34.18	86.33	32.75	7199.42
	19	2	78.01	51.18	133.76	F	52.42	55.75	11.69	7199.52
		3	103.28	66.47	168.80	F	55.38	65.52	15.03	7199.52
	28	2	66.07	43.78	81.93	F	50.92	15.86	11.17	7195.69
		3	81.54	64.48	112.93	F	26.45	31.39	18.09	7199.69
3	9	2	123.58	81.85	197.50	F	50.99	73.92	8.27	7199.34
		3	153.44	111.40	227.11	F	37.74	73.67	15.00	7199.30
	19	2	79.65	51.02	110.39	F	56.12	30.74	10.60	7199.42
		3	99.13	65.90	128.08	F	50.43	28.95	27.03	7199.12
	28	2	64.44	47.04	156.58	F	36.99	92.14	8.26	7199.66
		3	79.88	77.62	77.62	O	2.91	-2.26	18.45	6329.61
4	9	2	128.86	128.86	128.86	O	0.00	0.00	10.72	7036.08
		3	152.63	114.08	197.95	F	33.79	45.32	17.34	7199.83
	19	2	77.28	52.25	107.38	F	47.92	30.10	14.82	7199.78
		3	103.32	66.49	195.80	F	55.39	92.48	8.40	7199.73
	28	2	64.50	50.45	109.04	F	27.85	44.54	11.16	7199.78
		3	79.65	51.87	117.95	F	53.57	38.30	17.69	7199.70
5	9	2	124.04	82.26	200.86	F	50.78	76.82	9.01	7199.84
		3	152.27	112.28	253.41	F	35.62	101.14	20.85	7199.91
	19	2	77.83	75.80	75.80	O	2.68	-2.03	14.08	6526.03
		3	101.02	72.96	101.61	F	38.46	0.59	13.59	7199.77
	28	2	64.66	62.01	62.01	O	4.27	-2.65	10.53	2922.56
		3	79.81	54.77	77.83	F	45.72	-1.98	17.50	7196.42
6	9	2	126.00	83.18	181.62	F	51.49	55.62	11.13	7200.39
		3	152.88	114.29	239.01	F	33.76	86.13	32.92	7200.33
	19	2	81.06	51.22	129.02	F	58.26	47.96	9.07	7200.45
		3	105.91	66.89	116.62	F	58.34	10.71	10.23	7200.36
	28	2	64.63	62.20	62.20	O	3.91	-2.43	13.91	4877.22
		3	81.06	61.40	81.84	F	32.02	0.78	17.01	7200.41
7	9	2	127.91	82.77	142.00	F	54.54	14.09	10.80	7200.30
		3	151.49	111.47	220.68	F	35.90	69.19	22.05	7200.11
	19	2	77.99	51.01	104.29	F	52.90	26.30	23.11	7200.27
		3	98.98	65.62	167.04	F	50.85	68.06	13.20	7199.06
	28	2	65.28	44.06	72.17	F	48.17	6.89	11.27	7200.27

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v	k	α	z^H	$\underline{z}$	$\bar{z}$	St.	Δ^H	$\bar{z} - z^H$	t^H (s)	t^S (s)
	3		81.39	51.37	92.70	F	58.43	11.31	12.02	7200.17
8	9	2	126.91	82.64	153.73	F	53.57	26.82	10.03	7200.00
		3	153.73	113.65	225.63	F	35.27	71.90	18.61	7200.48
	19	2	80.45	52.43	110.79	F	53.44	30.34	9.10	7200.16
		3	104.24	67.37	172.25	F	54.73	68.01	10.90	7200.20
	28	2	67.42	42.72	101.41	F	57.82	33.99	7.46	7200.34
		3	82.07	61.52	80.36	F	33.41	-1.71	14.83	7200.48
9	9	2	125.72	82.55	139.03	F	52.30	13.31	15.71	7200.06
		3	152.63	112.93	242.99	F	35.15	90.36	27.79	7200.30
	19	2	78.01	52.71	75.82	F	48.01	-2.19	12.09	7200.39
		3	101.32	65.81	172.41	F	53.96	71.09	13.87	7200.19
	28	2	64.29	52.43	67.23	F	22.62	2.94	8.39	7200.41
		3	77.99	65.03	104.05	F	19.93	26.06	23.51	7200.39

Table 19: Computational results for GRASP against CPLEX with warm start on instance **rat575-384-191**.

v	k	α	z^H	$\underline{z}$	$\bar{z}$	St.	Δ^H	$\bar{z} - z^H$	t^H (s)	t^S (s)
0	9	2	128.41	127.02	127.02	O	1.09	-1.39	16.52	326.88
		3	152.50	149.05	149.05	O	2.31	-3.45	27.21	581.72
	19	2	78.92	75.15	75.15	O	5.02	-3.77	15.44	239.39
		3	106.30	98.98	98.98	O	7.40	-7.32	12.28	361.30
	28	2	64.78	62.29	62.29	O	4.00	-2.49	14.41	235.66
		3	80.95	76.53	76.53	O	5.78	-4.42	13.58	669.53
1	9	2	125.88	125.72	125.72	O	0.13	-0.16	17.12	429.52
		3	154.46	145.67	145.67	O	6.03	-8.79	26.99	1210.81
	19	2	80.95	76.69	76.69	O	5.55	-4.26	8.99	300.19
		3	101.32	98.23	98.23	O	3.15	-3.09	23.10	313.09
	28	2	66.04	62.59	62.59	O	5.51	-3.45	9.63	561.56
		3	81.04	76.92	76.92	O	5.36	-4.12	15.37	295.19
2	9	2	122.49	122.49	122.49	O	0.00	0.00	12.85	283.86
		3	151.21	143.12	143.12	O	5.65	-8.09	32.82	704.08
	19	2	78.01	75.03	75.03	O	3.97	-2.98	11.73	293.98
		3	103.28	99.32	99.32	O	3.99	-3.96	15.31	401.70
	28	2	66.07	62.13	62.13	O	6.34	-3.94	11.23	606.97
		3	81.54	76.40	76.40	O	6.73	-5.14	18.11	425.27
3	9	2	123.58	123.47	123.47	O	0.09	-0.11	8.27	346.05
		3	153.44	144.97	144.97	O	5.84	-8.47	15.03	607.86
	19	2	79.65	76.01	76.01	O	4.79	-3.64	11.03	371.91
		3	99.13	97.42	97.42	O	1.76	-1.71	27.63	211.67
	28	2	64.44	62.82	62.82	O	2.58	-1.62	8.22	495.41
		3	79.88	77.62	77.62	O	2.91	-2.26	18.39	379.94
4	9	2	128.86	128.86	128.86	O	0.00	0.00	10.69	201.45
		3	152.63	145.60	145.60	O	4.83	-7.03	17.34	641.84
	19	2	77.28	74.25	74.25	O	4.08	-3.03	14.77	206.36
		3	103.32	97.58	97.58	O	5.88	-5.74	8.38	543.64
	28	2	64.50	62.43	62.43	O	3.32	-2.07	11.08	214.78
		3	79.65	76.16	76.16	O	4.58	-3.49	17.86	250.84
5	9	2	124.04	123.58	123.58	O	0.37	-0.46	8.86	398.47
		3	152.27	143.18	143.18	O	6.35	-9.09	20.80	614.34
	19	2	77.83	75.80	75.80	O	2.68	-2.03	14.00	216.73
		3	101.02	97.53	97.53	O	3.58	-3.49	13.82	309.03
	28	2	64.66	62.01	62.01	O	4.27	-2.65	10.50	649.16
		3	79.81	76.49	76.49	O	4.34	-3.32	17.47	320.03
6	9	2	126.00	124.39	124.39	O	1.29	-1.61	11.09	430.09
		3	152.88	151.03	151.03	O	1.22	-1.85	32.70	569.42
	19	2	81.06	77.88	77.88	O	4.08	-3.18	8.72	218.03
		3	105.91	97.75	97.75	O	8.35	-8.16	10.08	518.50
	28	2	64.63	62.20	62.20	O	3.91	-2.43	13.73	207.95

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v	k	α	z^H	$\underline{z}$	$\bar{z}$	St.	Δ^H	$\bar{z} - z^H$	t^H (s)	t^S (s)
	3		81.06	79.31	79.31	O	2.21	-1.75	14.27	400.89
7	9	2	127.91	126.63	126.63	O	1.01	-1.28	10.66	529.25
		3	151.49	144.20	144.20	O	5.06	-7.29	22.53	1014.52
	19	2	77.99	75.00	75.00	O	3.99	-2.99	23.05	205.25
		3	98.98	97.06	97.06	O	1.98	-1.92	13.19	353.66
	28	2	65.28	62.65	62.65	O	4.20	-2.63	11.27	337.86
		3	81.39	76.16	76.16	O	6.87	-5.23	12.00	487.88
8	9	2	126.91	126.91	126.91	O	0.00	0.00	9.65	281.81
		3	153.73	145.34	145.34	O	5.77	-8.39	18.67	956.67
	19	2	80.45	78.77	78.77	O	2.13	-1.68	9.11	293.69
		3	104.24	98.27	98.27	O	6.08	-5.97	10.90	538.00
	28	2	67.42	63.07	63.07	O	6.90	-4.35	7.38	252.33
		3	82.07	79.71	79.71	O	2.96	-2.36	14.71	351.59
9	9	2	125.72	122.97	122.97	O	2.24	-2.75	15.61	494.77
		3	152.63	144.14	144.14	O	5.89	-8.49	27.73	799.89
	19	2	78.01	75.82	75.82	O	2.89	-2.19	12.04	250.92
		3	101.32	99.01	99.01	O	2.33	-2.31	13.86	566.98
	28	2	64.29	61.52	61.52	O	4.50	-2.77	8.69	303.53
		3	77.99	76.54	76.54	O	1.89	-1.45	23.53	355.19

Table 20: Computational results for GRASP against CPLEX without warm start on instance **rat783-522-261**.

v	k	α	z^H	$\underline{z}$	$\bar{z}$	St.	Δ^H	$\bar{z} - z^H$	t^H (s)	t^S (s)
0	13	2	118.80	76.83	550.32	F	54.63	431.52	14.55	7200.59
		3	150.21	100.18	586.62	F	49.94	436.41	25.05	7201.62
	26	2	78.10	49.76	543.52	F	56.96	465.42	19.32	7202.02
		3	95.34	63.55	486.81	F	50.02	391.47	47.15	7201.69
	39	2	64.28	59.54	60.42	F	7.96	-3.86	36.74	7201.92
		3	77.47	51.78	564.35	F	49.61	486.88	45.32	7197.89
1	13	2	115.75	75.49	553.20	F	53.32	437.45	26.89	7199.80
		3	148.71	98.61	582.34	F	50.80	433.63	34.70	7200.28
	26	2	77.88	49.18	589.94	F	58.35	512.06	30.98	7200.02
		3	97.35	62.54	477.85	F	55.67	380.50	33.42	7200.94
	39	2	64.14	45.18	171.42	F	41.97	107.28	22.73	7199.88
		3	79.40	49.56	269.36	F	60.21	189.96	30.24	7200.12
2	13	2	115.32	76.28	181.21	F	51.19	65.89	13.89	7198.73
		3	154.24	99.81	507.56	F	54.54	353.32	25.41	7200.03
	26	2	79.31	51.59	345.12	F	53.72	265.81	42.16	7199.70
		3	99.46	63.18	121.15	F	57.43	21.69	40.18	7200.19
	39	2	63.89	59.46	59.46	O	7.45	-4.43	19.18	5330.75
		3	80.02	52.15	172.41	F	53.45	92.39	37.51	7199.64
3	13	2	113.45	75.54	162.41	F	50.19	48.96	25.01	7200.20
		3	150.00	98.72	512.94	F	51.94	362.94	29.94	7199.14
	26	2	78.45	63.59	130.27	F	23.36	51.82	31.67	7200.16
		3	96.90	62.67	181.03	F	54.63	84.13	62.83	7200.20
	39	2	64.82	61.81	61.81	O	4.87	-3.01	20.62	875.16
		3	79.65	66.59	95.52	F	19.60	15.87	23.78	7200.22
4	13	2	113.14	76.24	178.36	F	48.41	65.22	33.45	7200.08
		3	151.60	99.12	549.04	F	52.94	397.44	30.58	7200.58
	26	2	79.16	49.59	94.37	F	59.62	15.21	25.87	7200.42
		3	95.52	63.12	320.94	F	51.34	225.42	37.08	7200.31
	39	2	63.64	39.96	306.20	F	59.26	242.56	18.25	7200.28
		3	79.56	49.61	162.25	F	60.38	82.69	24.10	7200.55
5	13	2	114.59	76.21	472.14	F	50.37	357.55	23.98	7200.16
		3	149.05	99.49	214.72	F	49.81	65.67	41.85	7200.92
	26	2	79.92	49.45	89.40	F	61.62	9.48	30.65	7199.69
		3	96.57	63.12	285.45	F	52.99	188.88	48.39	7200.84
	39	2	63.25	44.00	71.28	F	43.75	8.03	13.93	7200.84

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v	k	α	z^H	$\underline{z}$	$\bar{z}$	St.	Δ^H	$\bar{z} - z^H$	t^H (s)	t^S (s)
	3		80.32	49.98	128.56	F	60.69	48.24	22.97	7201.05
6	13	2	119.92	75.58	152.86	F	58.66	32.94	19.97	7200.97
		3	152.27	98.62	243.74	F	54.40	91.47	41.29	7200.84
	26	2	79.40	49.31	108.67	F	61.03	29.27	20.07	7201.20
		3	94.85	62.61	505.00	F	51.50	410.15	46.64	7200.81
	39	2	64.01	39.42	76.97	F	62.40	12.96	15.80	7200.94
		3	79.40	49.23	119.82	F	61.27	40.42	19.66	7200.22
7	13	2	115.32	76.22	152.49	F	51.29	37.17	15.55	7200.66
		3	150.08	100.45	571.06	F	49.41	420.98	73.60	7200.91
	26	2	78.55	50.03	158.62	F	57.02	80.07	27.09	7200.62
		3	97.42	63.30	182.62	F	53.90	85.20	43.52	7201.00
	39	2	64.40	55.14	75.59	F	16.79	11.19	14.80	7200.73
		3	79.00	50.05	558.87	F	57.83	479.87	23.97	7200.89
8	13	2	118.70	76.34	193.05	F	55.49	74.35	18.46	7201.02
		3	152.71	99.60	278.00	F	53.32	125.29	42.87	7200.72
	26	2	80.13	49.55	102.08	F	61.73	21.95	15.56	7200.88
		3	95.80	62.97	185.98	F	52.14	90.18	59.64	7200.83
	39	2	64.20	39.39	198.34	F	62.98	134.14	20.08	7200.80
		3	79.25	49.29	107.04	F	60.79	27.79	24.95	7201.23
9	13	2	114.04	74.93	143.67	F	52.20	29.63	24.01	7201.17
		3	150.27	97.57	230.99	F	54.01	80.72	28.30	7200.95
	26	2	81.01	49.30	104.55	F	64.31	23.54	36.96	7200.48
		3	97.35	62.14	126.65	F	56.66	29.30	30.12	7201.05
	39	2	63.60	39.20	164.68	F	62.23	101.08	13.31	7201.02
		3	80.50	53.67	126.12	F	50.00	45.62	43.89	7200.94

Table 21: Computational results for GRASP against CPLEX with warm start on instance rat783-522-261.

v	k	α	z^H	$\underline{z}$	$\bar{z}$	St.	Δ^H	$\bar{z} - z^H$	t^H (s)	t^S (s)
0	13	2	118.80	111.41	111.41	O	6.63	-7.39	14.82	1734.33
		3	150.21	150.08	150.08	O	0.09	-0.13	25.32	1277.92
	26	2	78.10	74.63	74.63	O	4.65	-3.47	19.81	1170.97
		3	95.34	92.11	92.11	O	3.51	-3.23	47.60	1475.33
	39	2	64.28	59.91	59.91	O	7.29	-4.37	36.80	1156.17
		3	77.47	75.60	75.60	O	2.47	-1.87	45.35	1482.67
1	13	2	115.75	111.61	111.61	O	3.71	-4.14	26.87	1342.80
		3	148.71	146.26	146.26	O	1.68	-2.45	34.62	1337.98
	26	2	77.88	75.47	75.47	O	3.19	-2.41	31.16	1810.50
		3	97.35	92.02	92.02	O	5.79	-5.33	33.44	2584.25
	39	2	64.14	58.82	58.82	O	9.05	-5.32	22.71	3134.97
		3	79.40	75.45	75.45	O	5.24	-3.95	30.43	3127.14
2	13	2	115.32	111.04	111.04	O	3.85	-4.28	13.97	992.41
		3	154.24	152.09	152.09	O	1.41	-2.15	25.66	2968.77
	26	2	79.31	75.58	75.58	O	4.94	-3.73	42.23	1635.84
		3	99.46	95.48	95.48	O	4.17	-3.98	40.17	2790.45
	39	2	63.89	59.46	59.46	O	7.45	-4.43	19.37	1870.06
		3	80.02	75.80	75.80	O	5.57	-4.22	37.54	1926.30
3	13	2	113.45	112.79	112.79	O	0.59	-0.66	25.25	3075.77
		3	150.00	148.22	148.22	O	1.20	-1.78	29.93	2628.92
	26	2	78.45	76.01	76.01	O	3.21	-2.44	30.90	1104.34
		3	96.90	92.13	92.13	O	5.18	-4.77	63.21	1489.06
	39	2	64.82	61.81	61.81	O	4.87	-3.01	20.79	484.72
		3	79.65	76.01	76.01	O	4.79	-3.64	25.89	2137.98
4	13	2	113.14	112.45	112.45	O	0.61	-0.69	34.74	833.47
		3	151.60	148.11	148.11	O	2.36	-3.49	30.83	3170.12
	26	2	79.16	75.93	75.93	O	4.25	-3.23	26.62	2605.89
		3	95.52	91.79	91.79	O	4.06	-3.73	37.34	1535.00
	39	2	63.64	59.40	59.41	O	7.13	-4.23	19.00	6193.67
		3								

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v	k	α	z^H	$\underline{z}$	$\bar{z}$	St.	Δ^H	$\bar{z} - z^H$	t^H (s)	t^S (s)
		3	79.56	76.22	76.22	O	4.38	-3.34	24.81	3056.42
5	13	2	114.59	112.31	112.31	O	2.03	-2.28	23.97	1733.47
		3	149.05	147.25	147.25	O	1.22	-1.80	42.23	2507.70
	26	2	79.92	74.32	74.32	O	7.53	-5.60	30.93	1527.41
		3	96.57	92.80	92.80	O	4.06	-3.77	48.68	2715.42
	39	2	63.25	59.82	59.82	O	5.73	-3.43	13.99	1529.45
		3	80.32	74.33	74.43	F	8.06	-5.89	22.98	7200.59
6	13	2	119.92	111.40	111.40	O	7.65	-8.52	20.02	2450.61
		3	152.27	150.43	150.43	O	1.22	-1.84	41.45	3385.12
	26	2	79.40	75.27	75.27	O	5.49	-4.13	19.98	3946.92
		3	94.85	92.01	92.01	O	3.09	-2.84	46.60	1504.75
	39	2	64.01	58.31	58.31	O	9.78	-5.70	15.85	1411.05
		3	79.40	75.06	75.06	O	5.78	-4.34	21.12	3370.34
7	13	2	115.32	112.31	112.31	O	2.68	-3.01	16.44	954.20
		3	150.08	148.22	148.22	O	1.25	-1.86	75.18	3098.00
	26	2	78.55	75.54	75.54	O	3.98	-3.01	27.61	3645.34
		3	97.42	92.14	92.14	O	5.73	-5.28	43.68	4460.34
	39	2	64.40	61.01	61.01	O	5.56	-3.39	16.55	3162.06
		3	79.00	75.24	75.24	O	5.00	-3.76	24.99	2926.05
8	13	2	118.70	112.68	112.68	O	5.34	-6.02	18.72	3363.31
		3	152.71	150.33	150.33	O	1.58	-2.38	42.88	4060.95
	26	2	80.13	75.03	75.03	O	6.80	-5.10	15.81	3002.05
		3	95.80	90.70	92.85	F	5.62	-2.95	61.30	7200.92
	39	2	64.20	59.93	59.93	O	7.12	-4.27	20.38	2208.17
		3	79.25	75.06	75.06	O	5.58	-4.19	25.54	2106.11
9	13	2	114.04	112.27	112.27	O	1.58	-1.77	24.13	2048.33
		3	150.27	149.05	149.05	O	0.82	-1.22	28.80	6209.73
	26	2	81.01	60.11	77.00	F	34.77	-4.01	37.02	7201.06
		3	97.35	92.09	92.09	O	5.71	-5.26	31.01	6298.23
	39	2	63.60	59.55	59.55	O	6.80	-4.05	13.66	3187.23
		3	80.50	75.61	75.61	O	6.47	-4.89	44.74	5392.00

Table 22: Computational results for GRASP against CPLEX without warm start on instance `dsj1000-667-333`.

v	k	α	z^H	$\underline{z}$	$\bar{z}$	St.	Δ^H	$\bar{z} - z^H$	t^H (s)	t^S (s)
0	16	2	240066.05	159936.00	720261.00	F	50.10	480194.95	31.64	7201.23
		3	333175.62	217165.00	1021720.00	F	53.42	688544.38	23.71	7200.88
	33	2	135457.30	103932.00	1222920.00	F	30.33	1087462.70	29.80	7203.20
		3	194438.73	128149.00	1130160.00	F	51.73	935721.27	53.29	7201.91
	49	2	119987.65	119114.00	119114.00	O	0.73	-873.65	28.43	3127.20
		3	138355.34	130433.00	189251.00	F	6.07	50895.66	51.56	7201.92
1	16	2	232985.63	156926.00	748177.00	F	48.47	515191.37	28.67	7198.36
		3	341431.19	217954.00	974732.00	F	56.65	633300.81	29.95	7201.94
	33	2	139507.20	135808.00	135808.00	O	2.72	-3699.20	44.04	3653.06
		3	191870.82	126912.00	245651.00	F	51.18	53780.18	72.09	7201.92
	49	2	129112.08	129112.00	129122.00	O	0.00	9.92	23.88	601.11
		3	140168.10	139507.00	139507.00	O	0.47	-661.10	65.17	4944.61
2	16	2	236945.60	157726.00	793519.00	F	50.23	556573.40	34.95	7200.89
		3	319531.69	215475.00	1233480.00	F	48.29	913948.31	47.49	7201.80
	33	2	138021.94	136187.00	136187.00	O	1.35	-1834.94	53.63	6384.72
		3	193633.43	126812.00	1042880.00	F	52.69	849246.57	44.99	7201.53
	49	2	117945.27	114385.00	114385.00	O	3.11	-3560.27	45.72	1117.84
		3	138432.92	136872.00	136872.00	O	1.14	-1560.92	79.00	3024.91
3	16	2	243199.05	160537.00	382880.00	F	51.49	139680.95	18.87	7201.98
		3	319571.06	219427.00	1045130.00	F	45.64	725558.94	36.01	7201.78
	33	2	143470.60	104344.00	489189.00	F	37.50	345718.40	39.22	7201.66
		3	191358.20	129422.00	1119560.00	F	47.86	928201.80	95.23	7201.66
	49	2	115674.83	113768.00	113768.00	O	1.68	-1906.83	42.08	675.67

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v	k	α	z^H	$\underline{z}$	$\bar{z}$	St.	Δ^H	$\bar{z} - z^H$	t^H (s)	t^S (s)
	3		150629.08	112222.00	766389.00	F	34.22	615759.92	86.23	7197.77
4	16	2	241105.98	159773.00	751727.00	F	50.91	510621.02	49.17	7201.69
		3	315894.05	218494.00	529884.00	F	44.58	213989.95	34.88	7201.31
	33	2	140941.96	135883.00	135883.00	O	3.72	-5058.96	33.33	5388.97
		3	198610.49	128975.00	1035610.00	F	53.99	836999.51	78.41	7201.25
	49	2	126368.46	126368.00	126368.00	O	0.00	-0.46	26.82	427.48
		3	146628.79	141381.00	141381.00	O	3.71	-5247.79	59.41	5269.97
5	16	2	234630.93	154634.00	816976.00	F	51.73	582345.07	37.45	7200.77
		3	327486.33	210516.00	1089500.00	F	55.56	762013.67	39.83	7201.02
	33	2	135858.26	134294.00	134294.00	O	1.16	-1564.26	37.65	6972.12
		3	189368.16	125596.00	917698.00	F	50.78	728329.84	41.98	7200.86
	49	2	117945.27	114385.00	114385.00	O	3.11	-3560.27	66.11	936.83
		3	139789.17	118189.00	159458.00	F	18.28	19668.83	68.63	7201.52
6	16	2	235038.32	156174.00	322864.00	F	50.50	87825.68	47.23	7201.22
		3	301402.61	213747.00	1164560.00	F	41.01	863157.39	33.72	7200.88
	33	2	136983.75	95393.40	838633.00	F	43.60	701649.25	43.49	7200.94
		3	199317.72	123868.00	316133.00	F	60.91	116815.28	36.62	7200.84
	49	2	115514.89	109146.00	109146.00	O	5.84	-6368.89	54.49	1872.70
		3	141611.36	96741.90	189195.00	F	46.38	47583.64	93.60	7200.98
7	16	2	232298.74	158638.00	923372.00	F	46.43	691073.26	46.80	7201.23
		3	324330.11	216765.00	450552.00	F	49.62	126221.89	41.94	7201.38
	33	2	140762.11	134254.00	134254.00	O	4.85	-6508.11	35.11	3017.91
		3	193623.67	128166.00	283022.00	F	51.07	89398.33	62.32	7201.47
	49	2	118490.08	118490.00	118490.00	O	0.00	-0.08	39.23	298.81
		3	142573.65	140762.00	140762.00	O	1.29	-1811.65	67.75	1820.89
8	16	2	237927.13	152103.00	622404.00	F	56.43	384476.87	20.31	7201.20
		3	307951.03	208393.00	1030290.00	F	47.77	722338.97	26.10	7201.23
	33	2	139697.18	109372.00	198891.00	F	27.73	59193.82	42.25	7201.62
		3	185650.43	123729.00	1092760.00	F	50.05	907109.57	47.65	7201.14
	49	2	115425.17	111207.00	111207.00	O	3.79	-4218.17	31.66	536.97
		3	142746.12	140502.00	140502.00	O	1.60	-2244.12	82.78	2227.95
9	16	2	242757.53	159232.00	691494.00	F	52.46	448736.47	37.97	7201.28
		3	319233.80	217583.00	414197.00	F	46.72	94963.20	49.80	7200.95
	33	2	143101.98	99356.60	168739.00	F	44.03	25637.02	34.99	7201.52
		3	194134.24	148990.00	334413.00	F	30.30	140278.76	45.57	7201.16
	49	2	118877.37	112866.00	112866.00	O	5.33	-6011.37	45.87	750.64
		3	143101.98	142384.00	142384.00	O	0.50	-717.98	59.20	6322.62

Table 23: Computational results for GRASP against CPLEX with warm start on instance dsj1000-667-333.

v	k	α	z^H	$\underline{z}$	$\bar{z}$	St.	Δ^H	$\bar{z} - z^H$	t^H (s)	t^S (s)
0	16	2	240066.05	237475.00	237475.00	O	1.09	-2591.05	32.09	1886.42
		3	333175.62	299038.00	299038.00	O	11.42	-34137.62	24.70	4746.52
	33	2	135457.30	133373.00	133373.00	O	1.56	-2084.30	30.50	4855.12
		3	194438.73	194439.00	194439.00	O	-0.00	0.27	55.15	1500.12
	49	2	119987.65	119114.00	119114.00	O	0.73	-873.65	29.81	1216.78
		3	138355.34	135457.00	135457.00	O	2.14	-2898.34	52.38	1965.36
1	16	2	232985.63	232986.00	232986.00	O	-0.00	0.37	29.71	2019.44
		3	341431.19	341431.00	341431.00	O	0.00	-0.19	30.63	3350.72
	33	2	139507.20	135808.00	135808.00	O	2.72	-3699.20	44.56	3456.56
		3	191870.82	188968.00	188968.00	O	1.54	-2902.82	73.45	2773.30
	49	2	129112.08	129112.00	129112.00	O	0.00	-0.08	24.21	706.39
		3	140168.10	139507.00	139507.00	O	0.47	-661.10	65.85	1765.78
2	16	2	236945.60	236454.00	236454.00	O	0.21	-491.60	35.33	2018.62
		3	319531.69	319532.00	319532.00	O	-0.00	0.31	47.40	2929.47
	33	2	138021.94	136187.00	136187.00	O	1.35	-1834.94	53.44	3430.95
		3	193633.43	193633.00	193633.00	O	0.00	-0.43	44.67	1477.89
	49	2	117945.27	114385.00	114385.00	O	3.11	-3560.27	43.28	1354.17

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v	k	α	z^H	$\underline{z}$	$\bar{z}$	St.	Δ^H	$\bar{z} - z^H$	t^H (s)	t^S (s)
	3		138432.92	136872.00	136872.00	O	1.14	-1560.92	80.44	1958.34
3	16	2	243199.05	234089.00	234089.00	O	3.89	-9110.05	19.04	2586.89
		3	319571.06	319571.00	319571.00	O	0.00	-0.06	36.33	2802.81
	33	2	143470.60	138804.00	138804.00	O	3.36	-4666.60	39.53	5338.61
		3	191358.20	191358.00	191358.00	O	0.00	-0.20	96.78	1309.06
	49	2	115674.83	113768.00	113772.00	O	1.68	-1902.83	42.63	1296.62
		3	150629.08	141863.00	141863.00	O	6.18	-8766.08	87.36	2682.98
4	16	2	241105.98	237524.00	237524.00	O	1.51	-3581.98	50.37	2198.17
		3	315894.05	307951.00	307951.00	O	2.58	-7943.05	35.05	4277.78
	33	2	140941.96	135883.00	135883.00	O	3.72	-5058.96	33.81	3278.39
		3	198610.49	198610.00	198610.00	O	0.00	-0.49	78.95	1100.62
	49	2	126368.46	126368.00	126368.00	O	0.00	-0.46	24.09	703.77
		3	146628.79	141381.00	141381.00	O	3.71	-5247.79	57.96	1371.53
5	16	2	234630.93	234631.00	234631.00	O	-0.00	0.07	37.41	1243.14
		3	327486.33	319234.00	319234.00	O	2.59	-8252.33	39.06	2398.38
	33	2	135858.26	134294.00	134294.00	O	1.16	-1564.26	37.68	2973.33
		3	189368.16	189368.00	189368.00	O	0.00	-0.16	40.38	1112.20
	49	2	117945.27	114385.00	114385.00	O	3.11	-3560.27	65.41	1075.03
		3	139789.17	136793.00	136793.00	O	2.19	-2996.17	69.18	2132.06
6	16	2	235038.32	235038.00	235038.00	O	0.00	-0.32	47.66	1248.08
		3	301402.61	301403.00	301403.00	O	-0.00	0.39	34.03	2750.06
	33	2	136983.75	134862.00	134862.00	O	1.57	-2121.75	44.23	1001.36
		3	199317.72	193710.00	193710.00	O	2.89	-5607.72	37.13	2084.19
	49	2	115514.89	109146.00	109146.00	O	5.84	-6368.89	55.42	1698.47
		3	141611.36	136984.00	136994.00	O	3.38	-4617.36	93.81	1322.56
7	16	2	232298.74	232299.00	232299.00	O	-0.00	0.26	47.35	1573.47
		3	324330.11	324330.00	324330.00	O	0.00	-0.11	42.22	1937.34
	33	2	140762.11	134254.00	134254.00	O	4.85	-6508.11	34.95	2983.61
		3	193623.67	192434.00	192434.00	O	0.62	-1189.67	63.21	1512.53
	49	2	118490.08	118490.00	118490.00	O	0.00	-0.08	38.63	566.52
		3	142573.65	140762.00	140762.00	O	1.29	-1811.65	68.23	1628.73
8	16	2	237927.13	235731.00	235731.00	O	0.93	-2196.13	20.36	1661.56
		3	307951.03	307951.00	307951.00	O	0.00	-0.03	26.37	2445.94
	33	2	139697.18	138028.00	138028.00	O	1.21	-1669.18	42.31	4553.09
		3	185650.43	185564.00	185564.00	O	0.05	-86.43	47.11	1643.97
	49	2	115425.17	111207.00	111207.00	O	3.79	-4218.17	31.46	1028.72
		3	142746.12	140502.00	140502.00	O	1.60	-2244.12	83.46	1791.06
9	16	2	242757.53	235548.00	235548.00	O	3.06	-7209.53	37.29	2154.62
		3	319233.80	319234.00	319234.00	O	-0.00	0.20	50.29	2696.03
	33	2	143101.98	139992.00	139992.00	O	2.22	-3109.98	35.72	1077.84
		3	194134.24	194134.00	194134.00	O	0.00	-0.24	45.50	1176.00
	49	2	118877.37	112866.00	112866.00	O	5.33	-6011.37	46.71	1422.03
		3	143101.98	142384.00	142384.00	O	0.50	-717.98	60.38	2667.78

Table 24: Computational results for GRASP against CPLEX without warm start on instance **r11323-882-441**.

v	k	α	z^H	$\underline{z}$	$\bar{z}$	St.	Δ^H	$\bar{z} - z^H$	t^H (s)	t^S (s)
0	22	2	3433.83	3281.45	18484.00	F	4.64	15050.17	35.15	7204.53
		3	3972.91	3369.22	18579.70	F	17.92	14606.79	85.06	7205.75
	44	2	3433.83	3433.83	3433.83	O	0.00	0.00	2.00	4007.19
		3	3547.20	3547.20	3547.20	O	0.00	0.00	8.18	4073.84
	66	2	3433.83	3433.83	3433.83	O	0.00	0.00	1.48	1866.34
		3	3547.20	3547.20	3547.20	O	0.00	0.00	3.27	1100.05
1	22	2	3124.04	2812.82	18464.00	F	11.06	15339.96	61.85	7201.47
		3	3808.14	2900.25	19931.80	F	31.30	16123.66	171.47	7201.70
	44	2	3124.04	3124.04	3124.04	O	0.00	0.00	1.43	1310.62
		3	3364.76	3364.76	3364.76	O	0.00	0.00	8.94	3758.00
	66	2	3124.04	3124.04	3124.04	O	0.00	0.00	0.59	453.27

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v	k	α	z^H	$\underline{z}$	$\bar{z}$	St.	Δ^H	$\bar{z} - z^H$	t^H (s)	t^S (s)
		3	3364.76	3364.76	3364.76	O	0.00	0.00	2.15	986.67
2	22	2	3078.87	1908.82	18145.60	F	61.30	15066.73	62.05	7201.66
		3	3949.72	2485.72	18124.10	F	58.90	14174.38	87.61	7202.14
	44	2	2751.91	2751.91	2751.91	O	0.00	0.00	4.14	2057.88
		3	2869.67	2869.67	2869.67	O	0.00	0.00	43.21	5468.34
	66	2	2751.91	2751.91	2751.91	O	0.00	0.00	0.68	955.33
		3	2869.67	2869.67	2869.67	O	0.00	0.00	3.28	1146.28
3	22	2	3474.85	3446.38	4284.96	F	0.83	810.11	32.15	7202.02
		3	3918.27	3480.84	17417.60	F	12.57	13499.33	77.27	7201.72
	44	2	3474.85	3474.85	3474.85	O	0.00	0.00	2.26	615.12
		3	3550.31	3550.31	3550.31	O	0.00	0.00	8.54	2790.17
	66	2	3474.85	3474.85	3474.85	O	0.00	0.00	1.80	443.30
		3	3550.31	3550.31	3550.31	O	0.00	0.00	4.69	2054.08
4	22	2	3043.22	1928.65	13256.00	F	57.79	10212.78	61.64	7201.88
		3	3907.83	2493.03	18763.80	F	56.75	14855.97	95.78	7202.59
	44	2	2579.84	2579.84	2580.01	O	0.00	0.17	7.66	1619.58
		3	3289.91	2403.58	4549.29	F	36.88	1259.38	11.63	7202.66
	66	2	2579.84	2579.84	2579.84	O	0.00	0.00	1.19	678.62
		3	3289.91	3289.91	3289.91	O	0.00	0.00	2.38	1091.91
5	22	2	3208.41	1970.56	19325.00	F	62.82	16116.59	58.55	7202.50
		3	3852.73	2487.91	17694.20	F	54.86	13841.47	155.22	7202.44
	44	2	2066.85	2021.87	2021.87	O	2.22	-44.98	75.91	3753.83
		3	3233.40	1990.53	3630.04	F	62.44	396.64	16.60	7202.27
	66	2	2021.87	2021.87	2021.87	O	0.00	0.00	12.64	670.70
		3	3233.40	3233.40	3233.40	O	0.00	0.00	3.90	1474.61
6	22	2	3001.30	1992.76	18705.00	F	50.61	15703.70	177.57	7202.09
		3	3960.13	2485.55	18203.20	F	59.33	14243.07	77.66	7201.81
	44	2	2068.65	2021.87	2021.87	O	2.31	-46.78	69.66	2903.59
		3	2618.78	2030.60	3632.00	F	28.97	1013.22	151.46	7201.27
	66	2	2021.87	2021.87	2021.87	O	0.00	0.00	12.07	891.42
		3	2488.73	2488.73	2488.73	O	0.00	0.00	20.43	2131.64
7	22	2	3531.41	3531.41	3947.29	F	0.00	415.88	29.11	7201.58
		3	3832.99	3505.38	18041.40	F	9.35	14208.41	143.47	7202.70
	44	2	3531.41	3531.41	3531.41	O	0.00	0.00	2.03	1228.17
		3	3550.31	3550.31	3550.31	O	0.00	0.00	10.50	2520.39
	66	2	3531.41	3531.41	3531.41	O	0.00	0.00	1.52	568.28
		3	3550.31	3550.31	3550.31	O	0.00	0.00	4.41	745.31
8	22	2	3017.09	2667.68	18484.00	F	13.10	15466.91	86.29	7202.00
		3	3810.84	2740.02	17572.40	F	39.08	13761.56	92.59	7201.75
	44	2	2948.00	2948.00	2948.00	O	0.00	0.00	3.96	1229.61
		3	3124.04	3124.04	3124.04	O	0.00	0.00	21.63	4694.00
	66	2	2948.00	2948.00	2948.00	O	0.00	0.00	0.84	454.12
		3	3124.04	3124.04	3124.04	O	0.00	0.00	4.21	857.88
9	22	2	3129.96	1943.70	13496.60	F	61.03	10366.64	64.23	7202.00
		3	3809.59	2491.59	17737.20	F	52.90	13927.61	152.09	7201.80
	44	2	2074.46	1916.02	2389.75	F	8.27	315.29	91.41	7201.86
		3	2948.00	1819.91	3417.30	F	61.99	469.30	43.29	7202.28
	66	2	1905.12	1905.12	1905.12	O	0.00	0.00	26.22	929.59
		3	2948.00	2948.00	2948.00	O	0.00	0.00	8.20	2028.89

Table 25: Computational results for GRASP against CPLEX with warm start on instance r11323-882-441.

v	k	α	z^H	$\underline{z}$	$\bar{z}$	St.	Δ^H	$\bar{z} - z^H$	t^H (s)	t^S (s)
0	22	2	3433.83	3433.83	3433.83	O	0.00	0.00	35.49	6092.55
		3	3972.91	3369.22	3972.91	F	17.92	0.00	86.01	7203.02
	44	2	3433.83	3433.83	3433.83	O	0.00	0.00	1.98	3422.91
		3	3547.20	3369.22	3547.20	F	5.28	0.00	8.02	7203.47
	66	2	3433.83	3433.83	3433.83	O	0.00	0.00	1.52	1242.66

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v	k	α	z^H	$\underline{z}$	$\bar{z}$	St.	Δ^H	$\bar{z} - z^H$	t^H (s)	t^S (s)
		3	3547.20	3369.22	3547.20	F	5.28	0.00	3.23	7203.52
1	22	2	3124.04	2812.82	3124.04	F	11.06	0.00	61.50	7203.53
		3	3808.14	2900.25	3808.14	F	31.30	0.00	172.14	7203.78
	44	2	3124.04	2812.82	3124.04	F	11.06	0.00	1.46	7203.34
		3	3364.76	2900.25	3364.76	F	16.02	0.00	9.00	7203.69
	66	2	3124.04	3124.04	3124.04	O	0.00	0.00	0.61	1768.59
		3	3364.76	2900.25	3364.76	F	16.02	0.00	2.18	7203.27
2	22	2	3078.87	2016.10	3078.87	F	52.71	0.00	62.04	7202.53
		3	3949.72	2479.34	3949.72	F	59.31	0.00	77.85	7202.81
	44	2	2751.91	2751.91	2751.91	O	0.00	0.00	3.71	2957.36
		3	2869.67	2233.83	2869.67	F	28.46	0.00	43.35	7202.66
	66	2	2751.91	2751.91	2751.91	O	0.00	0.00	0.65	1078.86
		3	2869.67	2869.67	2869.67	O	0.00	0.00	3.38	4160.62
3	22	2	3474.85	3474.85	3474.85	O	0.00	0.00	31.90	1629.66
		3	3918.27	3480.84	3918.27	F	12.57	0.00	76.71	7203.06
	44	2	3474.85	3474.85	3474.85	O	0.00	0.00	2.17	726.16
		3	3550.31	3480.84	3550.31	F	2.00	0.00	8.04	7203.39
	66	2	3474.85	3474.85	3474.85	O	0.00	0.00	1.79	455.64
		3	3550.31	3550.31	3550.31	O	0.00	0.00	4.68	4884.34
4	22	2	3043.22	2579.84	3043.22	F	17.96	0.00	60.99	7205.16
		3	3907.83	2492.57	3907.83	F	56.78	0.00	94.90	7203.02
	44	2	2579.84	2579.84	2579.84	O	0.00	0.00	7.68	2024.31
		3	3289.91	3289.91	3289.91	O	0.00	0.00	11.55	5839.97
	66	2	2579.84	2579.84	2579.84	O	0.00	0.00	1.20	1056.52
		3	3289.91	3289.91	3289.91	O	0.00	0.00	2.35	1877.39
5	22	2	3208.41	1970.56	3208.41	F	62.82	0.00	57.65	7203.02
		3	3852.73	2487.15	3852.73	F	54.91	0.00	155.24	7202.66
	44	2	2066.85	2021.87	2021.87	O	2.22	-44.98	75.20	6714.52
		3	3233.40	3233.40	3233.40	O	0.00	0.00	16.07	6503.36
	66	2	2021.87	2021.87	2021.87	O	0.00	0.00	12.41	1928.31
		3	3233.40	3233.40	3233.40	O	0.00	0.00	3.82	2818.98
6	22	2	3001.30	1992.76	3001.30	F	50.61	0.00	174.96	7202.36
		3	3960.13	2477.71	3960.13	F	59.83	0.00	77.14	7201.64
	44	2	2068.65	2021.87	2021.87	O	2.31	-46.78	69.10	3929.52
		3	2618.78	2030.60	2618.78	F	28.97	0.00	147.90	7202.31
	66	2	2021.87	2021.87	2021.87	O	0.00	0.00	11.21	256.91
		3	2488.73	2488.73	2488.73	O	0.00	0.00	19.84	3380.08
7	22	2	3531.41	3531.41	3531.41	O	0.00	0.00	28.78	7105.64
		3	3832.99	3505.38	3832.99	F	9.35	0.00	141.30	7202.70
	44	2	3531.41	3531.41	3531.41	O	0.00	0.00	2.01	1952.05
		3	3550.31	3550.31	3550.31	O	0.00	0.00	10.38	6066.73
	66	2	3531.41	3531.41	3531.41	O	0.00	0.00	1.55	990.53
		3	3550.31	3550.31	3550.31	O	0.00	0.00	4.35	1412.27
8	22	2	3017.09	2667.68	3017.09	F	13.10	0.00	86.33	7202.61
		3	3810.84	2740.02	3810.84	F	39.08	0.00	92.73	7202.48
	44	2	2948.00	2948.00	2948.00	O	0.00	0.00	3.56	3356.17
		3	3124.04	3124.04	3124.04	O	0.00	0.00	21.21	7144.89
	66	2	2948.00	2948.00	2948.00	O	0.00	0.00	0.83	824.52
		3	3124.04	3124.04	3124.04	O	0.00	0.00	4.05	4335.97
9	22	2	3129.96	2170.57	3078.57	F	44.20	-51.39	62.76	7202.38
		3	3809.59	2489.48	3809.59	F	53.03	0.00	149.00	7202.48
	44	2	2074.46	1905.12	1993.86	F	8.89	-80.60	89.34	7202.28
		3	2948.00	1819.91	2948.00	F	61.99	0.00	41.48	7202.59
	66	2	1905.12	1905.12	1905.12	O	0.00	0.00	25.06	1160.94
		3	2948.00	2948.00	2948.00	O	0.00	0.00	7.75	3076.09

Table 26: Computational results for GRASP against CPLEX without warm start on instance r11889-1260-629.

v	k	α	z^H	$\underline{z}$	$\bar{z}$	St.	Δ^H	$\bar{z} - z^H$	t^H (s)	t^S (s)
0	31	2	2566.01	1568.79	19441.20	F	63.57	16875.19	169.96	7205.23
		3	3149.89	0.00	20148.00	F	—	16998.11	262.08	8107.97
	62	2	1770.22	1123.45	19910.00	F	57.57	18139.78	368.46	7204.73
		3	2193.77	1330.91	20148.00	F	64.83	17954.23	425.17	7204.92
	94	2	1394.09	1123.45	1752.28	F	24.09	358.19	252.38	7204.47
		3	1760.00	1175.31	20148.00	F	49.75	18388.00	302.53	7205.02
1	31	2	2525.83	1564.06	18121.00	F	61.49	15595.17	172.09	7203.88
		3	3176.05	1990.35	20043.70	F	59.57	16867.65	257.48	7363.34
	62	2	1772.79	1046.22	14829.50	F	69.45	13056.71	332.21	7205.66
		3	2204.04	1324.57	20043.70	F	66.40	17839.66	227.05	7207.81
	94	2	1425.98	828.62	13049.60	F	72.09	11623.62	172.82	7205.59
		3	1756.36	1040.60	20242.30	F	68.78	18485.94	364.62	7205.16
2	31	2	2524.14	1580.36	16743.10	F	59.72	14218.96	287.30	7230.78
		3	3153.32	2004.58	20334.00	F	57.31	17180.68	511.85	7192.56
	62	2	1812.03	1062.10	15009.20	F	70.61	13197.17	144.19	7205.23
		3	2222.61	1341.11	20014.80	F	65.73	17792.19	229.49	7197.56
	94	2	1403.18	842.13	19854.00	F	66.62	18450.82	221.28	7205.64
		3	1760.00	1057.57	18172.50	F	66.42	16412.50	280.91	7203.86
3	31	2	2542.96	1574.04	19854.00	F	61.56	17311.04	188.48	7205.36
		3	3160.81	2000.51	19313.10	F	58.00	16152.29	475.06	7204.44
	62	2	1820.53	1095.31	19854.00	F	66.21	18033.47	153.21	7205.17
		3	2214.97	1334.70	19184.40	F	65.95	16969.43	264.45	7204.91
	94	2	1414.26	1398.99	1398.99	O	1.09	-15.27	183.15	7157.17
		3	1765.70	1254.82	2663.37	F	40.71	897.67	252.73	7204.75
4	31	2	2517.81	1569.72	19371.00	F	60.40	16853.19	365.18	7242.52
		3	3173.80	1998.05	20052.80	F	58.84	16879.00	288.62	7204.83
	62	2	1792.26	1048.73	14697.50	F	70.90	12905.24	283.24	7205.44
		3	2262.50	1329.58	20009.50	F	70.17	17747.00	197.85	7204.53
	94	2	1410.63	973.37	1734.84	F	44.92	324.21	386.90	7204.58
		3	1767.83	1043.11	19222.10	F	69.48	17454.27	320.51	7205.77
5	31	2	2511.54	1574.39	18866.00	F	59.52	16354.46	180.88	7204.94
		3	3167.30	1996.59	19441.50	F	58.64	16274.20	314.35	7204.88
	62	2	1789.79	1193.75	18866.00	F	49.93	17076.21	170.40	7204.98
		3	2222.61	1332.56	19441.50	F	66.79	17218.89	197.02	7206.88
	94	2	1396.20	1203.22	1704.72	F	16.04	308.52	244.43	7204.39
		3	1797.04	1209.33	2103.38	F	48.60	306.34	211.44	7204.69
6	31	2	2509.10	1576.36	20048.00	F	59.17	17538.90	186.30	7204.98
		3	3129.22	0.00	19498.70	F	—	16369.48	482.53	7953.34
	62	2	1773.29	1047.92	14474.50	F	69.22	12701.21	418.77	7205.12
		3	2208.06	1334.73	19728.50	F	65.43	17520.44	379.98	7231.91
	94	2	1435.86	827.89	10857.00	F	73.44	9421.14	122.01	7204.53
		3	1773.29	1042.21	19728.50	F	70.15	17955.21	206.80	7204.83
7	31	2	2502.88	1575.04	19848.00	F	58.91	17345.12	318.31	7208.56
		3	3204.76	2003.89	19221.30	F	59.93	16016.54	190.56	7205.09
	62	2	1762.84	1052.98	13120.50	F	67.41	11357.66	213.60	7197.56
		3	2208.12	1336.68	19666.50	F	65.19	17458.38	192.63	7205.27
	94	2	1418.96	906.61	3973.32	F	56.51	2554.36	260.66	7204.84
		3	1741.95	1049.04	19666.50	F	66.05	17924.55	369.63	7205.03
8	31	2	2525.83	1565.85	18085.00	F	61.31	15559.17	220.47	7204.38
		3	3164.36	1997.80	19590.20	F	58.39	16425.84	224.35	7205.39
	62	2	1810.29	1047.29	15693.00	F	72.85	13882.71	262.26	7206.16
		3	2218.77	1330.53	19313.60	F	66.76	17094.83	331.69	7205.05
	94	2	1410.46	864.22	18085.00	F	63.21	16674.54	182.79	7205.31
		3	1773.70	1044.42	19313.60	F	69.83	17539.90	361.32	7205.11
9	31	2	2571.73	1577.73	17210.00	F	63.00	14638.27	178.44	7237.03
		3	3195.52	2005.49	19313.10	F	59.34	16117.58	213.64	7205.30
	62	2	1818.28	1057.72	11924.70	F	71.91	10106.42	141.62	7205.66
		3	2185.04	1338.25	19238.70	F	63.28	17053.66	462.70	7205.31
	94	2	1430.19	892.73	19665.00	F	60.20	18234.81	211.99	7204.72

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v	k	α	z^H	$\underline{z}$	$\bar{z}$	St.	Δ^H	$\bar{z} - z^H$	t^H (s)	t^S (s)
	3		1765.16	1051.72	20056.80	F	67.84	18291.64	511.54	7205.78

Table 27: Computational results for GRASP against CPLEX with warm start on instance **r11889-1260-629**.

v	k	α	z^H	$\underline{z}$	$\bar{z}$	St.	Δ^H	$\bar{z} - z^H$	t^H (s)	t^S (s)
0	31	2	2566.01	0.00	2566.01	F	—	0.00	169.08	8695.31
		3	3149.89	0.00	3149.89	F	—	0.00	261.36	8336.44
	62	2	1770.22	1123.45	1770.22	F	57.57	0.00	368.06	7207.16
		3	2193.77	1330.63	2193.77	F	64.87	0.00	420.67	7469.45
	94	2	1394.09	1123.45	1394.09	F	24.09	0.00	250.83	7208.69
		3	1760.00	1175.31	1760.00	F	49.75	0.00	295.39	7207.30
1	31	2	2525.83	0.00	2525.83	F	—	0.00	167.60	9015.80
		3	3176.05	0.00	3176.05	F	—	0.00	251.22	8489.50
	62	2	1772.79	1046.11	1772.79	F	69.46	0.00	332.45	7206.41
		3	2204.04	1324.54	2204.04	F	66.40	0.00	228.01	7205.61
	94	2	1425.98	828.23	1425.98	F	72.17	0.00	168.27	7208.55
		3	1756.36	1040.56	1756.36	F	68.79	0.00	363.49	7206.58
2	31	2	2524.14	1580.34	2524.14	F	59.72	0.00	289.31	7262.80
		3	3153.32	0.00	3153.32	F	—	0.00	512.81	8265.22
	62	2	1812.03	1062.09	1812.03	F	70.61	0.00	144.29	7205.69
		3	2222.61	1341.04	2222.61	F	65.74	0.00	229.25	7206.08
	94	2	1403.18	842.13	1403.18	F	66.62	0.00	223.67	7206.91
		3	1760.00	1057.45	1760.00	F	66.44	0.00	281.97	7206.20
3	31	2	2542.96	1574.00	2542.96	F	61.56	0.00	185.52	7205.80
		3	3160.81	0.00	3160.81	F	—	0.00	475.74	7897.03
	62	2	1820.53	1095.31	1820.53	F	66.21	0.00	151.03	7205.77
		3	2214.97	1334.68	2214.97	F	65.96	0.00	263.17	7205.53
	94	2	1414.26	1398.99	1398.99	O	1.09	-15.27	181.95	6431.41
		3	1765.70	1254.82	1765.70	F	40.71	0.00	259.00	7205.78
4	31	2	2517.81	1569.72	2517.81	F	60.40	0.00	369.03	7196.56
		3	3173.80	1998.05	3173.80	F	58.84	0.00	285.70	8108.70
	62	2	1792.26	1071.00	1792.26	F	67.34	0.00	287.02	7208.64
		3	2262.50	1329.55	2262.50	F	70.17	0.00	196.31	7205.27
	94	2	1410.63	971.77	1410.63	F	45.16	0.00	394.36	7204.59
		3	1767.83	1043.09	1767.83	F	69.48	0.00	325.46	7206.23
5	31	2	2511.54	1574.39	2511.54	F	59.52	0.00	183.10	7205.83
		3	3167.30	0.00	3167.30	F	—	0.00	322.70	7993.64
	62	2	1789.79	1193.75	1789.79	F	49.93	0.00	175.92	7205.66
		3	2222.61	1332.56	2222.61	F	66.79	0.00	202.45	7205.33
	94	2	1396.20	1193.75	1396.20	F	16.96	0.00	245.79	7691.00
		3	1797.04	1209.33	1797.04	F	48.60	0.00	217.22	7205.33
6	31	2	2509.10	1576.36	2509.10	F	59.17	0.00	190.22	7205.48
		3	3129.22	0.00	3129.22	F	—	0.00	488.96	7742.72
	62	2	1773.29	1088.08	1773.29	F	62.97	0.00	424.24	7204.72
		3	2208.06	1364.64	2208.06	F	61.81	0.00	385.69	7236.19
	94	2	1435.86	1200.00	1415.82	F	19.65	-20.04	125.67	7205.52
		3	1773.29	1071.23	1773.29	F	65.54	0.00	212.81	7429.56
7	31	2	2502.88	1605.90	2502.88	F	55.86	0.00	327.34	7435.70
		3	3204.76	2003.89	3204.76	F	59.93	0.00	194.59	7205.80
	62	2	1762.84	1184.98	1761.24	F	48.77	-1.60	218.48	7204.80
		3	2208.12	1336.68	2208.12	F	65.19	0.00	199.91	7205.95
	94	2	1418.96	906.61	1418.96	F	56.51	0.00	262.45	7205.59
		3	1741.95	1049.04	1741.95	F	66.05	0.00	373.58	7205.52
8	31	2	2525.83	1589.46	2525.83	F	58.91	0.00	225.25	7419.75
		3	3164.36	1997.80	3164.36	F	58.39	0.00	229.95	7205.59
	62	2	1810.29	1308.12	1810.29	F	38.39	0.00	272.13	7204.31
		3	2218.77	1330.53	2218.77	F	66.76	0.00	333.81	7204.61
	94	2	1410.46	864.22	1410.46	F	63.21	0.00	184.16	7204.95

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v	k	α	z^H	$\underline{z}$	$\bar{z}$	St.	Δ^H	$\bar{z} - z^H$	t^H (s)	t^S (s)
		3	1773.70	1044.14	1773.70	F	69.87	0.00	365.02	7205.42
9	31	2	2571.73	1596.73	2571.73	F	61.06	0.00	177.87	7651.00
		3	3195.52	2005.49	3195.52	F	59.34	0.00	217.03	7205.73
	62	2	1818.28	1097.24	1816.56	F	65.71	-1.72	144.15	7196.92
		3	2185.04	1370.24	2185.04	F	59.46	0.00	465.48	7212.30
	94	2	1430.19	892.73	1430.19	F	60.20	0.00	216.26	7205.14
		3	1765.16	1051.72	1765.16	F	67.84	0.00	517.74	7205.56