

Multi-commodity vs. Single-commodity Routing

Claudia Archetti

Department of Quantitative Methods, University of Brescia, Brescia, Italy, archetti@eco.unibs.it

Ann Melissa Campbell

Department of Management Sciences, University of Iowa, Iowa City, IA, USA, ann-campbell@uiowa.edu

M. Grazia Speranza

Department of Quantitative Methods, University of Brescia, Brescia, Italy, speranza@eco.unibs.it

Appendix

In Table 1 we report the detailed results of the computational study on large instances. The first five columns of the table give the instance characteristics: the benchmark original instance, the number of commodities, the probability that each commodity is requested by each customer, the demand range and the value of α . Then, the following four columns refer to solution cost. First, we report the value of the C-VRP solution and then the percentage gap of the VRP, C-SDVRP and SDVRP with respect to the C-VRP, respectively. The last four columns refer to the number of routes. Again, we report the value of the C-VRP solution and then the percentage gap of the VRP, C-SDVRP and SDVRP with respect to the C-VRP, respectively. For each combination of characteristics, each line corresponds to one of the five randomly generated instances.

Table 1: Detailed results on large instances

						Cost				Routes			
						C-VRP	VRP	C-SDVRP	SDVRP	C-VRP	VRP	C-SDVRP	SDVRP
C101	2	60%	[1;100]	$\alpha = 1.1$	2285.828	5.98	10.96	10.96	31	-3.23	0.00	0.00	
					2508.654	8.80	13.10	13.10	36	-2.78	0.00	0.00	
					2323.104	8.61	10.37	11.92	32	-3.13	0.00	3.13	
					2414.225	8.76	11.01	11.01	34	2.94	5.88	5.88	
					2296.396	8.02	11.08	11.08	33	0.00	3.03	3.03	
C101	2	60%	[1;100]	$\alpha = 1.5$	1825.381	10.24	13.79	13.79	24	4.17	4.17	4.17	
					1971.290	11.40	13.08	14.08	26	0.00	0.00	3.85	
					1857.747	13.30	14.17	14.85	24	0.00	0.00	4.17	
					1881.958	13.24	13.90	13.90	24	0.00	0.00	0.00	
					1845.434	13.58	16.32	16.32	25	4.00	8.00	8.00	
C101	2	60%	[1;100]	$\alpha = 2$	1775.844	14.70	16.41	16.57	18	0.00	5.56	5.56	
					1871.573	13.41	14.43	14.43	20	0.00	5.00	5.00	
					1817.354	13.09	13.51	13.51	18	0.00	0.00	0.00	
					1875.298	17.14	17.91	17.91	18	0.00	0.00	0.00	
					1854.990	16.56	16.66	16.66	18	0.00	0.00	0.00	
C101	2	60%	[1;100]	$\alpha = 2.5$	1577.939	17.82	18.03	18.03	14	0.00	0.00	0.00	
					1655.051	16.24	16.24	16.93	16	6.25	6.25	6.25	
					1652.841	19.71	19.91	19.91	15	6.67	6.67	6.67	
					1628.615	17.54	17.89	18.15	15	6.67	6.67	6.67	
					1633.911	19.06	19.42	19.42	14	0.00	0.00	0.00	
C101	2	60%	[40;60]	$\alpha = 1.1$	3910.381	2.87	4.93	6.66	63	1.59	3.17	11.11	
					4166.529	2.87	5.35	15.37	66	0.00	1.52	15.15	
					3938.635	3.97	4.64	16.35	63	1.59	3.17	17.46	
					4081.495	2.62	5.90	15.80	64	-3.13	0.00	15.63	
					3952.782	6.30	7.07	7.27	63	1.59	3.17	6.35	
C101	2	60%	[40;60]	$\alpha = 1.5$	2923.051	6.98	8.11	8.11	43	0.00	2.33	2.33	
					3015.581	3.55	6.35	11.98	45	-4.44	0.00	8.89	
					2866.297	7.11	8.11	12.75	43	0.00	2.33	9.30	
					2923.377	3.46	6.33	10.35	44	-4.55	0.00	9.09	
					2885.484	8.61	8.89	12.88	43	0.00	0.00	9.30	
C101	2	60%	[40;60]	$\alpha = 2$	2620.640	8.86	9.51	10.51	31	0.00	3.23	6.45	
					2772.815	8.10	9.48	9.48	34	2.94	2.94	2.94	
					2689.183	9.61	10.43	10.83	31	3.23	3.23	6.45	
					2761.277	10.53	11.51	12.80	31	0.00	0.00	3.23	
					2697.566	8.44	8.63	8.63	32	3.13	3.13	3.13	
C101	2	60%	[40;60]	$\alpha = 2.5$	2222.101	9.96	11.43	11.43	25	4.00	4.00	4.00	
					2330.052	12.30	12.80	12.80	26	0.00	3.85	3.85	
					2281.616	13.78	14.33	14.33	25	4.00	4.00	4.00	
					2342.424	14.51	14.51	14.51	26	7.69	7.69	7.69	
					2314.411	14.71	14.71	14.71	25	4.00	4.00	4.00	
C101	2	100%	[1;100]	$\alpha = 1.1$	3975.565	17.89	20.85	20.85	50	-4.00	0.00	0.00	
					4111.800	20.21	25.05	25.05	50	-8.00	-2.00	-2.00	
					4256.346	15.57	20.67	20.72	54	-7.41	0.00	1.85	
					4272.572	14.97	21.91	21.91	54	-7.41	0.00	0.00	
					4048.559	19.96	24.34	24.34	50	-8.00	0.00	0.00	
C101	2	100%	[1;100]	$\alpha = 1.5$	3104.438	22.65	24.08	24.08	36	-2.78	0.00	0.00	
					3163.624	25.30	26.46	26.70	37	-2.70	0.00	2.70	
					3282.612	20.61	23.04	23.38	39	-2.56	0.00	2.56	
					3303.410	23.24	24.32	24.51	40	0.00	2.50	5.00	
					3125.704	24.83	26.29	26.35	36	-2.78	0.00	2.78	
C101	2	100%	[1;100]	$\alpha = 2$	2535.470	14.57	16.03	16.03	27	0.00	0.00	0.00	
					2600.542	14.67	16.56	16.56	28	0.00	3.57	3.57	
					2659.944	13.43	15.17	15.17	29	-3.45	0.00	0.00	
					2654.263	13.72	14.48	14.48	29	0.00	0.00	0.00	
					2579.543	15.07	16.26	16.26	27	0.00	0.00	0.00	
C101	2	100%	[1;100]	$\alpha = 2.5$	2211.294	18.94	20.38	20.38	22	0.00	4.55	4.55	
					2232.381	16.77	17.72	17.72	22	0.00	0.00	0.00	
					2266.483	16.20	16.93	16.93	23	0.00	0.00	0.00	
					2293.781	16.40	16.73	17.23	24	0.00	4.17	4.17	
					2231.645	17.78	18.88	18.88	22	0.00	4.55	4.55	

					Cost				Routes			
					C-VRP	VRP	C-SDVRP	SDVRP	C-VRP	VRP	C-SDVRP	SDVRP
C101	2	100%	[40;60]	$\alpha = 1.1$	6819.722	15.38	17.84	17.84	94	-6.38	-1.06	-1.06
					6998.930	17.55	20.74	24.67	95	-5.26	-2.11	9.47
					6986.562	17.40	17.71	30.26	98	-2.04	-1.02	19.39
					7060.633	18.27	19.11	23.09	99	-1.01	3.03	9.09
					6896.242	16.32	19.73	25.82	95	-5.26	0.00	11.58
C101	2	100%	[40;60]	$\alpha = 1.5$	4839.192	-10.32	19.13	19.13	63	-44.44	-1.59	-1.59
					4995.625	-7.20	21.74	21.74	64	-46.88	0.00	4.69
					4967.782	-13.13	19.96	19.96	66	-43.94	1.52	1.52
					5011.876	-11.74	21.34	21.34	66	-42.42	3.03	3.03
					4961.480	-6.69	22.04	22.04	66	-37.88	4.55	4.55
C101	2	100%	[40;60]	$\alpha = 2$	3810.287	5.64	12.26	13.95	46	-8.70	0.00	6.52
					3839.045	6.35	10.22	10.22	46	-8.70	0.00	0.00
					3863.475	6.94	11.92	11.92	47	-6.38	0.00	0.00
					3873.251	7.18	10.69	13.33	47	-6.38	0.00	6.38
					3837.660	6.32	11.40	11.40	46	-8.70	0.00	0.00
C101	2	100%	[40;60]	$\alpha = 2.5$	3121.872	9.49	12.41	12.41	36	-8.33	2.78	2.78
					3149.308	7.19	11.47	11.47	36	-5.56	0.00	0.00
					3167.846	6.54	12.23	12.60	36	-13.89	0.00	2.78
					3186.239	3.21	11.65	11.65	37	-13.51	0.00	0.00
					3132.123	7.51	11.63	11.79	36	-5.56	0.00	5.56
C101	3	60%	[1;100]	$\alpha = 1.1$	2708.298	14.68	17.54	17.54	36	0.00	2.78	2.78
					2843.568	14.13	15.37	15.37	38	0.00	2.63	2.63
					2957.865	11.53	15.50	15.50	38	0.00	2.63	2.63
					2833.850	17.38	20.02	20.02	38	0.00	5.26	5.26
					3008.333	12.44	15.91	15.91	39	2.56	2.56	2.56
C101	3	60%	[1;100]	$\alpha = 1.5$	2237.009	22.54	22.90	23.15	26	0.00	0.00	3.85
					2344.371	21.22	22.70	22.70	29	3.45	6.90	-27.59
					2341.657	17.82	18.51	18.51	28	3.57	0.00	0.00
					2275.210	22.16	22.51	23.13	27	0.00	0.00	3.70
					2445.740	18.07	20.76	20.76	29	0.00	3.45	3.45
C101	3	60%	[1;100]	$\alpha = 2$	2182.763	24.33	24.33	24.33	20	5.00	5.00	5.00
					2267.487	26.28	27.03	27.03	21	4.76	4.76	4.76
					2319.753	26.05	26.18	26.18	21	0.00	0.00	0.00
					2383.515	28.47	28.59	28.59	21	4.76	4.76	4.76
					2347.259	25.97	26.73	26.73	22	4.55	4.55	4.55
C101	3	60%	[1;100]	$\alpha = 2.5$	1967.187	27.96	28.16	28.16	17	11.76	11.76	11.76
					2013.622	28.35	28.35	28.35	17	5.88	5.88	5.88
					2099.891	30.81	30.81	30.81	18	5.56	5.56	5.56
					2129.503	31.51	31.51	31.51	17	5.88	5.88	5.88
					2111.906	30.45	31.51	31.51	18	5.56	5.56	5.56
C101	3	60%	[40;60]	$\alpha = 1.1$	3767.042	8.41	11.91	11.91	55	-3.64	1.82	1.82
					4074.157	2.35	13.86	13.86	59	-13.56	3.39	3.39
					4102.664	5.89	12.17	12.17	58	-3.45	5.17	5.17
					4012.531	5.78	12.32	12.32	58	-6.90	1.72	1.72
					4162.321	6.08	12.32	12.32	60	-10.00	5.00	5.00
C101	3	60%	[40;60]	$\alpha = 1.5$	2887.756	15.75	16.05	16.05	39	2.56	2.56	2.56
					3014.251	13.63	16.20	16.20	41	2.44	2.44	2.44
					3099.377	13.50	15.77	15.77	40	0.00	2.50	2.50
					3022.385	15.23	16.10	16.10	41	2.44	4.88	7.32
					3076.154	10.09	13.10	14.09	41	0.00	0.00	4.88
C101	3	60%	[40;60]	$\alpha = 2$	2757.290	16.84	17.66	17.66	29	0.00	0.00	0.00
					2965.860	19.88	20.89	20.89	31	0.00	3.23	3.23
					2906.131	18.30	20.29	20.29	30	3.33	3.33	3.33
					3008.556	19.82	21.31	21.31	31	3.23	3.23	3.23
					2986.278	20.42	21.65	21.65	31	-3.23	0.00	0.00
C101	3	60%	[40;60]	$\alpha = 2.5$	2372.239	20.45	20.94	20.94	23	0.00	4.35	4.35
					2532.872	21.65	22.15	22.15	25	4.00	4.00	4.00
					2488.310	21.63	22.54	22.54	25	8.00	8.00	8.00
					2607.029	23.60	24.28	24.39	25	4.00	4.00	8.00
					2546.721	24.22	24.22	24.22	25	4.00	4.00	4.00

						Cost				Routes			
						C-VRP	VRP	C-SDVRP	SDVRP	C-VRP	VRP	C-SDVRP	SDVRP
C101	3	100%	[1;100]	$\alpha = 1.1$	4689.870	19.31	26.26	26.26	54	-9.26	-1.85	-1.85	
					4543.522	21.79	27.04	27.04	54	-5.56	1.85	1.85	
					4559.014	22.98	27.73	27.73	53	-3.77	0.00	0.00	
					4861.866	22.80	29.45	29.45	57	-10.53	0.00	0.00	
					4564.600	25.43	29.57	29.57	52	-7.69	0.00	0.00	
C101	3	100%	[1;100]	$\alpha = 1.5$	3767.661	30.72	30.72	30.72	40	0.00	0.00	0.00	
					3681.521	30.94	31.69	31.69	39	-2.56	-2.56	-2.56	
					3695.468	30.60	31.48	31.48	38	-2.63	-5.26	-5.26	
					3901.570	32.15	32.29	32.29	41	-2.44	-4.88	-4.88	
					3681.245	32.25	33.29	33.36	39	0.00	2.56	7.69	
C101	3	100%	[1;100]	$\alpha = 2$	3115.395	24.76	26.16	26.16	30	0.00	3.33	3.33	
					3010.599	24.99	27.16	27.16	30	0.00	6.67	6.67	
					3021.497	23.64	25.18	25.30	29	0.00	3.45	3.45	
					3218.612	24.19	25.12	25.12	31	0.00	3.23	3.23	
					3036.387	25.01	25.98	25.98	28	-3.57	0.00	0.00	
C101	3	100%	[1;100]	$\alpha = 2.5$	2743.039	28.85	29.65	29.65	24	0.00	4.17	4.17	
					2705.842	30.51	30.85	30.85	24	4.17	4.17	4.17	
					2719.055	30.61	31.32	31.32	24	4.17	4.17	4.17	
					2782.399	27.30	27.63	27.63	25	0.00	0.00	0.00	
					2692.934	29.04	29.04	29.58	23	4.35	4.35	4.35	
C101	3	100%	[40;60]	$\alpha = 1.1$	6888.845	16.23	23.94	23.94	87	-14.94	-1.15	-1.15	
					6745.516	14.45	23.75	23.75	86	-16.28	-1.16	-1.16	
					6782.676	14.92	23.32	23.32	86	-16.28	-1.16	-1.16	
					6980.297	17.32	24.19	24.19	90	-11.11	0.00	0.00	
					6789.760	15.00	23.79	24.68	87	-14.94	0.00	8.05	
C101	3	100%	[40;60]	$\alpha = 1.5$	5143.231	-11.97	26.33	26.33	61	-62.30	0.00	0.00	
					5099.061	-11.99	25.69	25.69	61	-60.66	-1.64	-1.64	
					5102.211	-12.57	26.46	26.46	60	-65.00	-1.67	-1.67	
					5207.974	-10.81	26.28	26.28	63	-58.73	0.00	0.00	
					5138.823	-12.02	25.56	25.56	62	-59.68	-1.61	-1.61	
C101	3	100%	[40;60]	$\alpha = 2$	4203.584	14.47	20.46	20.65	46	-8.70	2.17	4.35	
					4147.408	13.31	19.88	19.88	46	-8.70	2.17	2.17	
					4139.095	13.14	19.83	19.83	45	-11.11	2.22	2.22	
					4221.187	14.83	18.87	20.14	46	-8.70	0.00	4.35	
					4172.640	13.84	19.01	19.01	45	-11.11	0.00	0.00	
C101	3	100%	[40;60]	$\alpha = 2.5$	3616.912	13.53	22.38	22.38	36	-16.67	0.00	0.00	
					3615.422	17.72	24.03	24.03	36	-11.11	0.00	0.00	
					3587.273	15.08	23.22	23.22	36	-13.89	0.00	0.00	
					3673.977	11.92	23.70	23.70	37	-18.92	2.70	2.70	
					3653.121	16.30	24.25	24.25	37	-10.81	2.70	5.41	
R101	2	60%	[1;100]	$\alpha = 1.1$	2171.129	10.52	11.74	11.74	31	-3.23	0.00	0.00	
					2423.915	8.98	11.15	11.15	36	2.78	2.78	2.78	
					2200.299	12.20	12.41	12.41	33	-3.03	0.00	0.00	
					2205.255	9.79	10.62	10.62	33	0.00	3.03	3.03	
					2085.412	11.09	12.07	12.07	32	-3.13	0.00	0.00	
R101	2	60%	[1;100]	$\alpha = 1.5$	1821.012	17.22	17.80	17.80	23	0.00	0.00	4.35	
					1939.364	12.17	13.07	13.07	26	0.00	3.85	3.85	
					1801.106	15.00	15.00	15.00	24	0.00	0.00	0.00	
					1812.441	14.25	14.52	15.51	25	4.00	4.00	8.00	
					1724.157	14.39	14.39	14.39	24	0.00	0.00	0.00	
R101	2	60%	[1;100]	$\alpha = 2$	1539.156	20.29	20.29	20.29	18	5.56	5.56	5.56	
					1646.249	17.18	17.18	17.23	20	5.00	5.00	5.00	
					1519.302	17.43	17.43	17.43	18	0.00	0.00	0.00	
					1521.142	16.63	16.63	16.63	18	0.00	0.00	0.00	
					1501.935	18.63	19.89	19.89	18	0.00	5.56	5.56	
R101	2	60%	[1;100]	$\alpha = 2.5$	1377.657	22.53	22.53	22.53	14	0.00	0.00	0.00	
					1466.531	19.67	19.67	19.67	16	6.25	6.25	6.25	
					1384.193	21.43	21.47	21.47	15	6.67	6.67	6.67	
					1383.995	20.16	20.33	20.33	14	0.00	0.00	0.00	
					1350.074	21.07	22.17	22.17	14	0.00	0.00	0.00	

					Cost				Routes			
					C-VRP	VRP	C-SDVRP	SDVRP	C-VRP	VRP	C-SDVRP	SDVRP
R101	2	60%	[40;60]	$\alpha = 1.1$	3584.706	5.95	6.31	15.08	62	0.00	1.61	14.52
					3811.362	5.18	6.20	8.17	65	-1.54	-1.54	9.23
					3616.763	6.80	7.53	7.53	64	3.13	3.13	3.13
					3685.616	6.29	7.58	9.59	67	2.99	5.97	14.93
					3525.042	6.45	7.25	7.86	64	3.13	4.69	14.06
R101	2	60%	[40;60]	$\alpha = 1.5$	2696.557	8.44	9.58	9.58	43	0.00	2.33	2.33
					2828.783	7.27	7.70	7.70	45	-4.44	-2.22	-2.22
					2695.828	9.95	9.95	9.95	43	2.33	4.65	4.65
					2761.495	8.31	9.35	9.35	45	-2.22	0.00	0.00
					2648.764	7.57	7.86	12.52	42	-4.76	-2.38	7.14
R101	2	60%	[40;60]	$\alpha = 2$	2171.049	11.58	12.69	14.41	31	0.00	3.23	6.45
					2270.247	11.82	12.11	12.11	33	0.00	3.03	3.03
					2141.877	11.25	11.45	13.80	31	3.23	0.00	6.45
					2183.589	11.91	12.28	12.28	32	0.00	3.13	3.13
					2143.004	12.55	13.56	13.56	32	3.13	6.25	6.25
R101	2	60%	[40;60]	$\alpha = 2.5$	1861.888	14.37	14.75	15.02	25	0.00	4.00	4.00
					1919.354	12.38	13.08	13.23	25	-4.00	0.00	0.00
					1835.493	13.66	13.98	13.98	25	4.00	4.00	4.00
					1862.912	13.14	13.63	13.63	25	0.00	4.00	4.00
					1821.766	13.84	14.31	14.82	25	0.00	4.00	8.00
R101	2	100%	[1;100]	$\alpha = 1.1$	3162.893	7.36	12.37	12.37	50	-6.00	2.00	2.00
					3242.014	7.75	12.57	12.57	51	-5.88	1.96	1.96
					3414.326	8.23	11.64	11.64	54	-5.56	1.85	1.85
					3406.702	6.52	10.50	10.50	53	-5.66	-1.89	-1.89
					3218.451	8.81	12.98	12.98	50	-4.00	2.00	2.00
R101	2	100%	[1;100]	$\alpha = 1.5$	2569.835	14.65	17.18	17.18	37	2.70	2.70	2.70
					2600.007	14.60	15.60	15.60	36	-2.78	-2.78	-2.78
					2705.306	13.26	15.00	15.91	39	-2.56	0.00	2.56
					2712.229	12.35	14.94	14.94	39	-2.56	0.00	0.00
					2579.324	15.50	16.66	17.24	36	-2.78	0.00	2.78
R101	2	100%	[1;100]	$\alpha = 2$	2148.455	19.03	20.13	20.13	27	-3.70	0.00	0.00
					2170.972	19.55	20.30	20.30	28	3.57	3.57	3.57
					2249.741	17.97	19.39	19.39	29	-3.45	0.00	0.00
					2254.327	16.98	18.94	18.94	29	0.00	0.00	0.00
					2137.734	19.66	19.66	19.66	27	0.00	0.00	0.00
R101	2	100%	[1;100]	$\alpha = 2.5$	1891.653	22.06	22.74	22.74	21	-4.76	0.00	0.00
					1922.106	23.57	23.72	23.72	22	0.00	0.00	0.00
					1981.712	21.82	22.64	22.64	23	-4.35	0.00	0.00
					1984.528	21.81	22.10	22.10	23	0.00	0.00	-4.35
					1907.000	23.89	24.94	24.94	22	0.00	4.55	4.55
R101	2	100%	[40;60]	$\alpha = 1.1$	5350.834	6.75	8.83	14.06	96	-4.17	2.08	8.33
					5394.429	7.51	9.44	12.19	97	-3.09	0.00	8.25
					5457.903	8.58	9.23	15.18	99	-1.01	0.00	13.13
					5461.201	8.64	10.16	14.86	99	-1.01	2.02	12.12
					5364.699	7.00	10.29	15.82	97	-3.09	2.06	13.40
R101	2	100%	[40;60]	$\alpha = 1.5$	3924.473	-17.40	10.41	10.41	64	-40.63	1.56	1.56
					3960.640	-20.11	9.49	9.49	65	-43.08	1.54	1.54
					3993.728	-20.31	10.04	10.04	66	-43.94	1.52	1.52
					3958.881	-20.32	9.48	9.48	65	-44.62	1.54	1.54
					3920.891	-17.62	10.85	10.85	64	-43.75	1.56	1.56
R101	2	100%	[40;60]	$\alpha = 2$	3069.032	8.65	13.97	13.97	45	-11.11	-2.22	-2.22
					3113.432	9.96	14.27	16.33	46	-8.70	0.00	4.35
					3121.374	10.18	13.80	13.80	48	-4.17	2.08	2.08
					3129.899	10.43	13.59	13.59	46	-8.70	-2.17	-2.17
					3067.263	8.60	13.42	13.42	46	-8.70	-2.17	-2.17
R101	2	100%	[40;60]	$\alpha = 2.5$	2593.563	14.56	16.97	17.77	36	-2.78	2.78	5.56
					2629.093	11.84	15.79	17.77	36	-8.33	-2.78	2.78
					2628.353	10.05	15.44	15.44	37	-8.11	2.70	2.70
					2642.311	10.67	16.56	16.56	37	-10.81	2.70	2.70
					2575.081	12.76	16.12	16.12	35	-8.57	-2.86	-2.86

						Cost				Routes			
						C-VRP	VRP	C-SDVRP	SDVRP	C-VRP	VRP	C-SDVRP	SDVRP
R101	3	60%	[1;100]	$\alpha = 1.1$	2625.144	18.63	20.31	20.31	35	-2.86	0.00	0.00	
					2779.207	17.62	19.08	19.08	37	0.00	0.00	0.00	
					2657.458	16.33	19.56	19.56	38	-2.63	2.63	2.63	
					2693.013	18.69	20.84	20.84	37	0.00	2.70	2.70	
					2735.813	17.58	19.40	19.40	40	0.00	5.00	5.00	
R101	3	60%	[1;100]	$\alpha = 1.5$	2210.472	24.31	25.89	25.89	26	0.00	3.85	3.85	
					2318.206	23.23	25.12	25.12	27	0.00	3.70	3.70	
					2205.685	22.10	23.43	23.43	28	3.57	3.57	3.57	
					2247.082	24.43	24.55	24.55	27	0.00	0.00	0.00	
					2284.628	23.73	25.20	25.20	29	3.45	3.45	3.45	
R101	3	60%	[1;100]	$\alpha = 2$	1931.836	29.83	30.42	30.42	20	5.00	5.00	5.00	
					2024.393	29.77	29.98	29.98	21	4.76	4.76	4.76	
					1937.057	28.36	28.64	28.64	21	0.00	0.00	0.00	
					1966.806	29.37	29.56	29.56	20	0.00	0.00	0.00	
					1971.352	29.59	30.11	30.11	22	4.55	4.55	4.55	
R101	3	60%	[1;100]	$\alpha = 2.5$	1781.196	35.61	35.61	35.61	17	11.76	11.76	11.76	
					1859.778	34.70	34.70	34.70	18	11.11	11.11	11.11	
					1773.677	32.63	33.02	33.02	18	5.56	11.11	11.11	
					1815.362	34.44	34.44	34.44	17	5.88	5.88	5.88	
					1807.247	32.99	33.41	33.41	18	5.56	5.56	5.56	
R101	3	60%	[40;60]	$\alpha = 1.1$	3582.664	12.53	14.92	14.92	55	-3.64	1.82	1.82	
					3829.615	7.79	14.39	14.39	60	-8.33	3.33	3.33	
					3570.315	9.78	14.98	14.98	57	-7.02	1.75	1.75	
					3711.417	9.47	15.77	15.77	59	-8.47	3.39	3.39	
					3662.966	6.53	14.15	14.15	59	-10.17	0.00	0.00	
R101	3	60%	[40;60]	$\alpha = 1.5$	2769.876	18.76	19.32	19.32	39	2.56	5.13	5.13	
					2930.980	16.69	18.91	18.91	40	-2.50	0.00	0.00	
					2766.485	17.15	18.48	18.48	40	-2.50	2.50	2.50	
					2848.578	17.82	18.72	18.72	41	2.44	2.44	2.44	
					2879.188	16.59	17.62	17.62	41	-2.44	0.00	0.00	
R101	3	60%	[40;60]	$\alpha = 2$	2329.760	21.82	22.48	22.48	28	-3.57	-3.57	-3.57	
					2475.615	22.27	22.61	23.60	31	3.23	3.23	6.45	
					2307.931	21.94	22.84	22.84	30	0.00	3.33	3.33	
					2399.262	22.85	23.13	23.13	31	3.23	3.23	3.23	
					2368.103	20.56	21.58	21.58	31	0.00	3.23	3.23	
R101	3	60%	[40;60]	$\alpha = 2.5$	2088.007	27.76	27.82	27.82	23	0.00	0.00	0.00	
					2193.205	26.24	26.89	26.89	25	4.00	4.00	4.00	
					2034.991	25.27	26.01	26.01	24	4.17	4.17	4.17	
					2122.403	25.87	26.54	26.54	25	4.00	4.00	4.00	
					2120.126	26.09	26.25	26.25	25	4.00	4.00	4.00	
R101	3	100%	[1;100]	$\alpha = 1.1$	3889.268	13.09	21.02	21.02	54	-9.26	0.00	0.00	
					3792.491	16.47	22.32	22.32	53	-7.55	1.89	1.89	
					3784.141	16.25	21.10	21.31	53	-3.77	1.89	3.77	
					3903.158	15.14	20.43	20.43	56	-10.71	0.00	0.00	
					3715.064	18.91	23.21	23.21	52	-5.77	1.92	1.92	
R101	3	100%	[1;100]	$\alpha = 1.5$	3174.655	24.15	26.13	26.13	39	-5.13	-2.56	-2.56	
					3151.830	25.20	28.13	28.13	39	-2.56	2.56	2.56	
					3129.185	24.36	26.60	26.60	39	-2.56	2.56	2.56	
					3225.508	22.93	26.49	26.49	42	-2.38	4.76	4.76	
					3091.706	26.67	29.14	29.14	38	-2.63	2.63	2.63	
R101	3	100%	[1;100]	$\alpha = 2$	2746.275	31.16	32.28	32.28	30	0.00	3.33	3.33	
					2725.810	32.30	33.36	33.36	30	3.33	3.33	3.33	
					2710.497	31.68	32.64	32.64	29	0.00	0.00	0.00	
					2776.340	30.86	32.41	32.49	31	0.00	3.23	3.23	
					2661.961	32.63	33.67	33.67	28	-3.57	0.00	0.00	
R101	3	100%	[1;100]	$\alpha = 2.5$	2495.365	35.93	36.73	36.73	24	0.00	0.00	0.00	
					2479.650	37.65	37.93	37.93	24	4.17	4.17	4.17	
					2466.813	37.14	37.14	37.14	24	4.17	4.17	4.17	
					2528.764	36.17	36.84	36.84	25	0.00	4.00	4.00	
					2466.474	38.11	38.75	38.75	24	4.17	4.17	4.17	

					Cost				Routes			
					C-VRP	VRP	C-SDVRP	SDVRP	C-VRP	VRP	C-SDVRP	SDVRP
R101	3	100%	[40;60]	$\alpha = 1.1$	5505.776	9.38	16.31	16.31	87	-14.94	-1.15	-1.15
					5423.635	8.01	16.29	16.29	87	-14.94	1.15	1.15
					5438.792	8.26	16.15	16.15	85	-17.65	-1.18	-1.18
					5567.774	10.39	15.98	16.23	89	-12.36	-1.12	2.25
					5457.762	8.58	16.79	16.79	86	-16.28	-1.16	-1.16
R101	3	100%	[40;60]	$\alpha = 1.5$	4222.251	-17.60	19.20	19.20	60	-65.00	-1.67	-1.67
					4217.012	-15.13	20.00	20.00	61	-60.66	1.64	1.64
					4208.566	-18.25	18.98	18.98	61	-62.30	1.64	1.64
					4253.320	-17.31	19.30	19.30	63	-58.73	3.17	3.17
					4207.618	-18.08	18.40	18.40	61	-62.30	0.00	0.00
R101	3	100%	[40;60]	$\alpha = 2$	3495.279	19.79	24.49	24.49	45	-11.11	0.00	0.00
					3463.367	19.05	24.64	24.64	46	-8.70	2.17	2.17
					3464.982	19.09	24.95	24.95	45	-11.11	2.22	2.22
					3523.642	20.44	24.61	24.61	47	-6.38	2.13	2.13
					3478.701	19.41	24.66	24.66	46	-8.70	2.17	2.17
R101	3	100%	[40;60]	$\alpha = 2.5$	3065.895	19.29	28.40	28.40	36	-16.67	0.00	0.00
					3022.741	20.99	27.66	28.06	36	-11.11	0.00	2.78
					3020.210	20.97	27.42	27.42	36	-13.89	0.00	0.00
					3061.249	17.12	26.78	26.78	37	-21.62	0.00	0.00
					3042.230	21.62	28.36	28.36	36	-13.89	0.00	0.00