

Appendix G

Longitudes, Latitudes, Demands, and Fixed Costs for CITY1990.GRT: An 88-Node Problem Defined on the Continental United States

No.	Long.	Lat.	First Demand	Second Demand	Fixed Cost	City	ST
1	73.945	40.671	7,322,564	2,819,401	189,600	New York	NY
2	118.411	34.112	3,485,398	1,217,405	244,500	Los Angeles	CA
3	87.685	41.837	2,783,726	1,025,174	78,700	Chicago	IL
4	95.387	29.769	1,630,553	616,877	58,000	Houston	TX
5	75.135	40.007	1,585,577	603,075	49,400	Philadelphia	PA
6	117.136	32.815	1,110,549	406,096	189,400	San Diego	CA
7	83.102	42.383	1,027,974	374,057	25,600	Detroit	MI
8	96.765	32.794	1,006,877	402,060	78,800	Dallas	TX
9	112.071	33.543	983,403	369,921	77,100	Phoenix	AZ
10	98.505	29.458	935,933	326,761	49,700	San Antonio	TX
11	121.850	37.304	782,248	250,218	259,100	San Jose	CA
12	76.611	39.301	736,014	276,484	54,700	Baltimore	MD
13	86.146	39.776	731,327	291,946	60,800	Indianapolis	IN
14	122.555	37.793	723,959	305,584	298,900	San Francisco	CA

15	81.658	30.335	635,230	241,384	62,900	Jacksonville	FL
16	82.987	39.989	632,910	256,996	66,000	Columbus	OH
17	87.967	43.063	628,088	240,540	53,500	Milwaukee	WI
18	90.006	35.106	610,337	229,829	55,700	Memphis	TN
19	77.016	38.905	606,900	249,634	123,900	Washington	DC
20	71.018	42.336	574,283	228,464	161,400	Boston	MA
21	122.350	47.622	516,259	236,702	137,900	Seattle	WA
22	106.438	31.849	515,342	160,545	58,500	El Paso	TX
23	81.679	41.480	505,616	199,787	40,900	Cleveland	OH
24	89.931	30.066	496,938	188,235	69,600	New Orleans	LA
25	86.785	36.172	488,374	198,585	74,400	Nashville-Davidson	TN
26	104.873	39.768	467,610	210,952	79,000	Denver	CO
27	97.751	30.306	465,622	192,148	72,600	Austin	TX
28	97.336	32.754	447,619	168,274	59,900	Fort Worth	TX
29	97.513	35.467	444,719	178,662	54,900	Oklahoma City	OK
30	122.658	45.539	437,319	187,268	59,200	Portland	OR
31	94.555	39.122	435,146	177,607	56,100	Kansas City	MO
32	118.160	33.789	429,433	158,975	222,900	Long Beach	CA
33	110.892	32.196	405,390	162,685	66,800	Tucson	AZ
34	90.244	38.636	396,685	164,931	50,700	St. Louis	MO
35	80.835	35.198	395,934	158,991	81,300	Charlotte	NC
36	84.423	33.763	394,017	155,752	71,200	Atlanta	GA
37	76.044	36.739	393,069	135,566	96,500	Virginia Beach	VA
38	106.625	35.117	384,736	153,818	85,900	Albuquerque	NM
39	122.225	37.772	372,242	144,521	177,400	Oakland	CA
40	79.977	40.439	369,879	153,483	41,200	Pittsburgh	PA
41	121.467	38.567	369,365	144,444	115,800	Sacramento	CA
42	93.267	44.962	368,383	160,682	71,700	Minneapolis	MN
43	95.916	36.128	367,302	155,447	60,500	Tulsa	OK
44	84.506	39.140	364,040	154,342	61,900	Cincinnati	OH
45	80.211	25.776	358,548	130,252	79,200	Miami	FL
46	119.793	36.781	354,202	121,807	80,300	Fresno	CA
47	96.012	41.264	335,795	133,842	54,600	Omaha	NE
48	83.582	41.664	332,943	130,883	48,900	Toledo	OH

49	78.860	42.890	328,123	136,436	46,700	Buffalo	NY
50	97.343	37.687	304,011	123,249	56,700	Wichita	KS
51	93.104	44.948	272,235	110,249	70,900	St. Paul	MN
52	91.126	30.449	219,531	83,340	67,900	Baton Rouge	LA
53	78.659	35.822	207,951	85,822	96,600	Raleigh	NC
54	77.475	37.531	203,056	85,337	66,600	Richmond	VA
55	90.208	32.321	196,637	71,865	54,600	Jackson	MS
56	93.617	41.577	193,187	78,453	49,500	Des Moines	IA
57	96.688	40.816	191,972	75,402	61,700	Lincoln	NE
58	89.388	43.080	191,262	77,361	75,200	Madison	WI
59	86.284	32.354	187,106	69,968	62,200	Montgomery	AL
60	92.354	34.722	175,795	72,573	64,200	Little Rock	AR
61	71.420	41.822	160,728	58,905	113,000	Providence	RI
62	111.930	40.777	159,936	66,657	67,200	Salt Lake City	UT
63	72.684	41.766	139,739	51,464	133,800	Hartford	CT
64	84.554	42.709	127,321	50,635	48,400	Lansing	MI
65	116.226	43.607	125,738	50,852	67,700	Boise City	ID
66	84.281	30.457	124,773	50,442	72,400	Tallahassee	FL
67	95.692	39.038	119,883	49,936	48,800	Topeka	KS
68	123.022	44.925	107,786	40,936	60,300	Salem	OR
69	89.645	39.781	105,227	45,006	59,200	Springfield	IL
70	73.799	42.666	101,082	42,121	101,800	Albany	NY
71	80.886	34.039	98,052	33,919	72,600	Columbia	SC
72	74.764	40.223	88,675	30,744	71,300	Trenton	NJ
73	81.630	38.351	57,287	25,306	66,100	Charleston	WV
74	105.954	35.679	55,859	22,789	99,000	Santa Fe	NM
75	76.885	40.276	52,376	21,520	38,400	Harrisburg	PA
76	104.792	41.145	50,008	20,243	68,700	Cheyenne	WY
77	100.767	46.805	49,256	19,315	67,900	Bismarck	ND
78	119.743	39.148	40,443	15,895	99,300	Carson City	NV
79	71.560	43.232	36,006	14,222	112,400	Concord	NH
80	92.190	38.572	35,481	14,162	61,500	Jefferson City	MO
81	122.894	47.042	33,840	14,951	77,800	Olympia	WA
82	76.503	38.972	33,187	14,061	138,500	Annapolis	MD

83	75.517	39.159	27,630	9,903	88,700	Dover	DE
84	84.865	38.191	25,968	11,037	61,500	Frankfort	KY
85	112.020	46.597	24,569	10,428	63,200	Helena	MT
86	69.730	44.331	21,325	8,856	79,500	Augusta	ME
87	100.322	44.373	12,906	5,063	59,500	Pierre	SD
88	72.572	44.266	8,247	3,514	94,100	Montpelier	VT
			44,840,571	17,224,029		Total	

Cities selected are the 50 most populous cities in the lower 48 states according to the 1990 Population and Housing Census as well as capitals of the lower 48 states.

The **First Demand** is the 1990 population. The **Second Demand** is the number of households in the city in 1990. The **Fixed Cost** is the 1990 median home value in the city.

Cities are sorted by their 1990 population.

All data are from the 1990 Population and Housing Census (U.S. Department of Commerce, 1990a, 1990b).

Appendix H

Longitudes, Latitudes, Demands, and Fixed Costs for SORTCAP.GRT: A 49-Node Problem Defined on the Continental United States

No.	Long.	Lat.	First Demand	Second Demand	Fixed Cost	City	ST
1	121.467	38.567	29,760,021	369,365	115,800	Sacramento	CA
2	73.799	42.666	17,990,455	101,082	101,800	Albany	NY
3	97.751	30.306	16,986,510	465,622	72,600	Austin	TX
4	84.281	30.457	12,937,926	124,773	72,400	Tallahassee	FL
5	76.885	40.276	11,881,643	52,376	38,400	Harrisburg	PA
6	89.645	39.781	11,430,602	105,227	59,200	Springfield	IL
7	82.987	39.989	10,847,115	632,910	66,000	Columbus	OH
8	84.554	42.709	9,295,297	127,321	48,400	Lansing	MI
9	74.764	40.223	7,730,188	88,675	71,300	Trenton	NJ
10	78.659	35.822	6,628,637	207,951	96,600	Raleigh	NC
11	84.423	33.763	6,478,216	394,017	71,200	Atlanta	GA
12	77.475	37.531	6,187,358	203,056	66,600	Richmond	VA
13	71.018	42.336	6,016,425	574,283	161,400	Boston	MA

14	86.146	39.776	5,544,159	731,327	60,800	Indianapolis	IN
15	92.190	38.572	5,117,073	35,481	61,500	Jefferson City	MO
16	89.388	43.080	4,891,769	191,262	75,200	Madison	WI
17	86.785	36.172	4,877,185	488,374	74,400	Nashville-Davidson	TN
18	122.894	47.042	4,866,692	33,840	77,800	Olympia	WA
19	76.503	38.972	4,781,468	33,187	138,500	Annapolis	MD
20	93.104	44.948	4,375,099	272,235	70,900	St. Paul	MD
21	91.126	30.449	4,219,973	219,531	67,900	Baton Rouge	LA
22	86.284	32.354	4,040,587	187,106	62,200	Montgomery	AL
23	84.865	38.191	3,685,296	25,968	61,500	Frankfort	KY
24	112.071	33.543	3,665,228	983,403	77,100	Phoenix	AZ
25	80.886	34.039	3,486,703	98,052	72,600	Columbia	SC
26	104.873	39.768	3,294,394	467,610	79,000	Denver	CO
27	72.684	41.766	3,287,116	139,739	133,800	Hartford	CT
28	97.513	35.467	3,145,585	444,719	54,900	Oklahoma City	OK
29	123.022	44.925	2,842,321	107,786	60,300	Salem	OR
30	93.617	41.577	2,776,755	193,187	49,500	Des Moines	IA
31	90.208	32.321	2,573,216	196,637	54,600	Jackson	MS
32	95.962	39.038	2,477,574	119,883	48,800	Topeka	KS
33	92.354	34.722	2,350,725	175,795	64,200	Little Rock	AR
34	81.630	38.351	1,793,477	57,287	66,100	Charleston	WV
35	111.930	40.777	1,722,850	159,936	67,200	Salt Lake City	UT
36	96.688	40.816	1,578,385	191,972	61,700	Lincoln	NE
37	105.954	35.679	1,515,069	55,859	99,000	Santa Fe	NM
38	69.730	44.331	1,227,928	21,325	79,500	Augusta	ME
39	119.743	39.148	1,201,833	40,443	99,300	Carson City	NV
40	71.560	43.232	1,109,252	36,006	112,400	Concord	NH
41	116.226	43.607	1,006,749	125,738	67,700	Boise City	ID
42	71.420	41.822	1,003,464	160,728	113,000	Providence	RI
43	112.020	46.597	799,065	24,569	63,200	Helena	MT
44	100.322	44.373	696,004	12,906	59,500	Pierre	SD
45	75.517	39.159	666,168	27,630	88,700	Dover	DE
46	100.767	46.805	638,800	49,256	67,900	Bismarck	ND
47	77.016	38.905	606,900	606,900	123,900	Washington	DC

48	72.572	44.266	562,758	8,247	94,100	Montpelier	VT
49	104.792	41.145	453,588	50,008	68,700	Cheyenne	WY
			247,051,601	10,220,590		Total	

Cities selected are the capitals of the lower 48 states as well as Washington, DC.

The **First Demand** is the 1990 state population. The **Second Demand** is the 1990 population of the state's capital. The **Fixed Cost** is the 1990 median home value in the city.

Cities are sorted by their 1990 state population.

All data are from the 1990 Population and Housing Census (U.S. Department of Commerce, 1990a, 1990b).