```
this paper\Scripts\python.exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=
     client --port=39082
     import sys; print('Python %s on %s' % (sys.version, sys.platform))
 4
     6
     PyDev console: starting.
     Python 3.9.7 (tags/v3.9.7:1016ef3, Aug 30 2021, 20:19:38) [MSC v.1929 64 bit (AMD64)] on win32
 8
     >>> runfile('E:/1 000/3 0000/1 00000/1 000000/1 000000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 000000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 000000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 000000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 000000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 0
     Code for this paper')
    Backend TkAgg is interactive backend. Turning interactive mode on.
     Waiting 5s.....
     Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
12
13
    CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
15
     Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
16
17
     Optimize a model with 802020 rows, 56000 columns and 2356040 nonzeros
     Model fingerprint: 0x5fc5161c
     Variable types: 0 continuous, 56000 integer (47131 binary)
20 Coefficient statistics:
21
      Matrix range [1e-01, 1e+15]
      Objective range [1e+00, 5e+01]
      Bounds range [1e+00, 1e+00]
23
24
      RHS range
                           [1e+00, 2e+15]
     Warning: Model contains large matrix coefficient range
26
     Warning: Model contains large rhs
27
            Consider reformulating model or setting NumericFocus parameter
28
            to avoid numerical issues.
     Presolve removed 522018 rows and 27183 columns (presolve time = 5s) ...
29
30
     Presolve removed 549488 rows and 28685 columns (presolve time = 10s) ...
     Presolve removed 549488 rows and 28685 columns (presolve time = 15s) ...
31
     Presolve removed 549488 rows and 28685 columns (presolve time = 20s) ...
    Presolve removed 693116 rows and 38929 columns
34
     Presolve time: 24.12s
35
     Presolved: 108904 rows, 17071 columns, 395896 nonzeros
     Variable types: 0 continuous, 17071 integer (16737 binary)
37
38
     Deterministic concurrent LP optimizer: primal and dual simplex (primal and dual model)
39
     Showing first log only...
40
41
     Root relaxation presolved: 17063 rows, 125948 columns, 412253 nonzeros
42
43
44
     Root simplex log...
45
46
     Iteration Objective
                                    Primal Inf. Dual Inf.
          0 -1.0731000e+04 0.000000e+00 1.330652e+05
47
       14279 1.9562093e+03 0.000000e+00 1.103126e+04
48
                                                                                   30s
49
       15687
                  1.9450854e+03 0.000000e+00 0.000000e+00
                                                                                   31s
50
       15687 1.9450854e+03 0.000000e+00 0.000000e+00
                                                                                   31s
51
       15687
                 1.9450854e+03 0.000000e+00 0.000000e+00
52
     Concurrent spin time: 1.17s
53
54
     Solved with primal simplex
55
     Root relaxation: objective 1.945085e+03, 15687 iterations, 6.16 seconds (5.66 work units)
56
57
58
        Nodes | Current Node | Objective Bounds
59
     Expl Unexpl | Obj Depth IntInf | Incumbent BestBd Gap | It/Node Time
60
              0 1945.08541 0 492
                                                  - 1945.08541
                                                                            - 35s
61
62
         0
              0 1949.00000 0 590
                                                  - 1949.00000
                                                                                41s
                                                                            - 42s
63
              0.1949.00000 0.550
                                                  - 1949 00000
         0
64
              0 1949.00000 0 607
                                                  - 1949.00000
                                                                                49s
65
              0 1949.00000 0 591
                                                  - 1949.00000
                                                                                49s
              0 1949.00000 0 1030
                                                   - 1949.00000
66
                                                                                67s
         0
67
         0
              0 1949.00000 0 981
                                                  - 1949,00000
                                                                                71s
68
         0
              0 1949.00000
                                 0.973
                                                  - 1949.00000
                                                                                75s
69
              0 1949.00000 0 994
                                                  - 1949.00000
                                                                                76s
70
                                                                                87s
         0
              0.1949.00000 0.246
                                                  - 1949 00000
71
         0
              0 1949.00000 0 234
                                                  - 1949.00000
                                                                                87s
              0 1950.13054 0 714
                                                  - 1950.13054
                                                                                90s
73
         0
              0 1950.13054
                                  0 686
                                                  - 1950.13054
                                                                                91s
74
                                                  - 1950.51265
                                                                                92s
         0
              0 1950.51265
                                  0 746
75
              0 1950.51265
                                  0 741
                                                  - 1950.51265
                                                                                92s
76
              0 1950.62382
                                  0.705
                                                  - 1950.62382
                                                                                92s
                                 0 769
                                                  - 1950.68534
                                                                                94s
77
         0
              0 1950.68534
                                                                                94s
78
         0
              0 1950.68534
                                  0 762
                                                  - 1950.68534
         0
              0 1950.68534
                                  0 791
                                                  - 1950.68534
                                                                                94s
79
```

unknown						
80	0	0 1952.08414	0 492	- 1952.08414	107s	
	0	0 1952.08414		- 1952.08414		
81					108s	
82	0	0 1952.08414		- 1952.08414	109s	
83	0	0 1952.13645	0 507	- 1952.13645	110s	
84	0	0 1952.22003	0 484	- 1952.22003	110s	
85	0	0 1952.29031		- 1952,29031	110s	
86	0	0 1952.30156				
				- 1952.30156	111s	
87	0	0 1952.31686		- 1952.31686	111s	
88	0	0 1952.36018	0 478	- 1952.36018	111s	
89	0	0 1952.43046	0 479	- 1952.43046	111s	
90	0	0 1952.48888		- 1952.48888	111s	
91	0	0 1952.54527		- 1952.54527	112s	
92	0	0 1952.56682		- 1952.56682	112s	
93	0	0 1952.56682	0 414	- 1952.56682	112s	
94	0	0 1952.98131	0 735	- 1952.98131	115s	
95	0	0 1952.98131	0 675	- 1952.98131	116s	
96	0	0 1953.03298		- 1953.03298	117s	
97	0	0 1953.03298		- 1953.03298	118s	
98	0	0 1953.06994	0 867	- 1953.06994	118s	
99	0	0 1953.06994	0 872	- 1953.06994	120s	
100	0	0 1953.06994	0 877	- 1953.06994	120s	
101	0	0 1953.06994		- 1953.06994	121s	
102	0	0 1953.13929		- 1953.13929	124s	
103	0	0 1953.13929		- 1953.13929	124s	
104	0	0 1953.16985	0 1035	- 1953.16985	127s	
105	0	0 1953.16985	0 972	- 1953.16985	128s	
106	0	0 1953.16985		- 1953.16985	128s	
107	0	0 1953.21844		- 1953.21844	129s	
108	0	0 1953.21844		- 1953.21844	130s	
109	0	0 1953.49059	0 1018	- 1953.49059	134s	
110	0	0 1953.49059	0 981	- 1953.49059	135s	
111	0	0 1953.49059		- 1953.49059	137s	
112	0	0 1953.70023		- 1953.70023	140s	
113	0	0 1953.70023		- 1953.70023	141s	
114	0	0 1953.70023		- 1953.70023	142s	
115	0	0 1953.70023	0 967	- 1953.70023	142s	
116	0	0 1953.77741	0 1131	- 1953.77741	146s	
117	0	0 1953.77741		- 1953.77741	151s	
118	0	0 1953.77741	0 1061	- 1953.77741		
119	0	0 1953.77741	0 1084	- 1953.77741	153s	
120	0	0 1953.77741	0 1055	- 1953.77741	153s	
121	0	0 1953.82430	0 964	- 1953.82430	156s	
122	0	0 1953.84095		- 1953.84095	160s	
123	0			- 1953.84095		
		0 1953.84095			162s	
124	0	0 1953.84095		- 1953.84095	166s	
125	0	0 1953.84095	0 1014	- 1953.84095	167s	
126	0	0 1954.00444	0 947	- 1954.00444	176s	
127	0			- 1954.00444	177s	
128	0	0 1954.00444		- 1954.00444	182s	
129	0	0 1954.00444		- 1954.00444	183s	
130	0	0 1954.11042	0 1136	- 1954.11042	195s	
131	0	0 1954.11042	0 1128	- 1954.11042	195s	
132	0	0 1954.11042		- 1954.11042	207s	
133	0	0 1954.11042		- 1954.11042	207s	
134	0	0 1954.19700		- 1954.19700	218s	
135	0	0 1954.19700		- 1954.19700	218s	
136	0	0 1954.19700	0 1168	- 1954.19700	221s	
137	0	0 1954.19700	0 1143	- 1954.19700	221s	
138	0	0 1954.29801		- 1954.29801	230s	
139	0	0 1954.29801	0 1142	- 1954.29801	231s	
140	0	0 1954.29801		- 1954.29801	241s	
141	0	0 1954.29801	0 1046	- 1954.29801	242s	
142	0	0 1954.41781	0 1296	- 1954.41781	251s	
143	0	0 1954.41781	0 1256	- 1954.41781	252s	
144	0	0 1954.41781		- 1954.41781	254s	
145	0			- 1954.41781	257s	
	_	0 1954.41781	0 1197			
146	0	0 1954.41781	0 1225	- 1954.41781	259s	
147	0	0 1954.41781	0 1217	- 1954.41781	259s	
148	0	0 1954.41781	0 1571	- 1954.41781	277s	
149	0	0 1954.41781		- 1954.41781	279s	
150	0	0 1954.41781		- 1954.41781	282s	
	_					
151	0	0 1954.41781		- 1954.41781	282s	
152	0	0 1954.41781	0 343	- 1954.41781	299s	
153	0	0 1954.41781	0 653	- 1954.41781	304s	
154	0	0 1954.41781	0 629	- 1954.41781	305s	
155	0	0 1954.41781		- 1954.41781	315s	
156	0	0 1954.41781	0 908	- 1954.41781	323s	
157	0	0 1954.41781	0 763	- 1954.41781	326s	
158	0	0 1954.41781	0 294	- 1954.41781	354s	
159	0	0 1954.41781		- 1954.41781	356s	
160	0	2 1954.41781	0 267	- 1954.41781	379s	
161	1	4 1954.68698		- 1954.68698	- 2045 382s	
162	3	8 1954.80204		- 1954.80204	- 1676 387s	
163	7	12 1955.41911	3 602	- 1955.41911	- 2962 410s	

```
164
           16 1955.66667 4 544
                                    - 1955.66667
                                                  - 4269 428s
      11
165
           19 1955.66667
                         5 504
                                    - 1955.66667
                                                  - 3992 432s
                                                  - 3470 457s
           23 1955.66667
                         6 498
166
       19
                                    - 1955.66667
167
      23
           27 1955.66667
                         7 461
                                    - 1955.66667
                                                  - 3781 461s
      27
           33 1955.66667 8 385
                                    - 1955.66667
168
                                                  - 3606 465s
169
      38
           43 1955.66667 10 611
                                    - 1955.66667
                                                   - 3158 475s
170
      44
          47 1955.66667 12 489
                                     - 1955.66667
                                                  - 3015 482s
171
      48
           54 1955.66667 13 457
                                     - 1955.66667
                                                   - 2987 485s
172
      63
           68 1955,66667 15 352
                                     - 1955.66667
                                                   - 2726 493s
173
           80 1955,66667 16 516
                                     - 1955.66667
                                                  - 2530 500s
      73
174
      87
           95 1955,66667 16 450
                                     - 1955.66667
                                                   - 2415 521s
                                                   - 2300 530s
175
      105
          106 1955.66667 17 739
                                     - 1955.66667
176
      122
          127 1955.66667 18 610
                                     - 1955.66667
                                                   - 2175 537s
          152 1955,66667 20 294
177
                                     - 1955.66667
                                                    - 1942 544s
      146
178
      183
          200 1955.66667 23 299
                                     - 1955.66667
                                                    - 1605 552s
      243 244 1956.85047 28 1293
179
                                      - 1955.66667
                                                    - 1270 560s
180
           283 1955.66667 29 290
                                     - 1955.66667
      305
                                                    - 1044 569s
          302 1960.42857 34 448
                                                    - 924 583s
181
      361
                                     - 1955.66667
                                                    - 959 593s
182
      381 313 1962.33333 39 321
                                     - 1955.66667
183
      403
           328 1964.00000 40 292
                                     - 1955.66667
                                                    - 977 610s
          357 1962.33333 45 299
184
      425
                                     - 1955.66667
                                                    - 1010 626s
185
      461 384 1962.33333 59 274
                                     - 1955.66667
                                                    - 988 638s
          411 1962.33333 71 266
                                                    - 982 657s
186
      497
                                     - 1955.66667
187
      528 431 1962.33333 83 477
                                     - 1955.66667
                                                   - 1010 674s
188
      556 484 1970.04348 87 1474
                                      - 1955.66667
                                                    - 1051 697s
189
      613\ \ 547\ 1973.79007\ \ 88\ 1273
                                      - 1955.66667
                                                    - 1038 722s
190
      689 610 1971.67380 91 698
                                     - 1955.66667
                                                   - 993 746s
191
      833 663 2129.00000 125 78
                                     - 1955.66667
                                                    - 871 769s
                                     - 1955.66667 - 818 803s
- 1955.66667 - 864 831s
192
      948 678 2991.33166 157 158
193
      978 689 1955.66667 7 681
194
    H 979 613
                         2189.0000000 1955.66667 10.7% 863 831s
      995 626 1960.11111 9 537 2189.00000 1955.66667 10.7% 901 857s
195
196
     1023 627 2102.56908 168 294 2189.00000 1955.66667 10.7% 900 968s
           628 1975.66667 12 138 2189.00000 1955.66667 10.7% 898 981s
197
198
     1026 629 2091.19627 204 461 2189.00000 1955.66667 10.7% 897 999s
199
     1027 630 2078.51515 22 983 2189.00000 1955.66667 10.7% 896 1010s
200
     1029 631 2062.71153 27 585 2189.00000 1955.66667 10.7% 894 1023s
201
     1030 632 2099.68376 59 415 2189.00000 1955.66667 10.7% 893 1046s
     1031 632 1957.33333 15 636 2189.00000 1955.66667 10.7% 893 1056s
202
203
     1032 633 2045.15504 25 523 2189.00000 1955.92810 10.6% 892 1084s
      1033 634 2028.34087 54 800 2189.00000 1956.33333 10.6% 891 1087s
204
205
     1034 634 1962.33333 74 865 2189.00000 1956.33333 10.6% 890 1093s
     1035 635 2019.73250 73 357 2189.00000 1958.52381 10.5% 889 1107s
206
207
     1036 636 2069.33333 130 750 2189.00000 1958.52381 10.5% 888 1116s
208
                          2169.0000000 1958.52381 9.70% 888 1133s
     1037 604 1966.77778 40 782 2169.00000 1959.85910 9.64% 887 1148s
209
     1038 605 2096.88268 183 799 2169.00000 1959.85910 9.64% 887 1153s
210
     1039 606 2032.33333 119 736 2169.00000 1959.85910 9.64% 886 1163s
     1040 606 1962.33333 21 724 2169.00000 1959.85910 9.64% 885 1169s
212
                          2149.0000000 1959.85910 8.80% 885 1180s
    H 1040 575
213
     1042 577 1962.33333 64 725 2149.00000 1959.85910 8.80% 883 1187s
214
     1043 577 1999.00000 65 507 2149.00000 1959.85910 8.80% 882 1197s
           578 1990.01000 15 819 2149.00000 1959.85910 8.80% 881 1206s
216
     1044
     1045 579 2067.57143 48 216 2149.00000 1959.85910 8.80% 881 1215s
217
218
     1046 579 1959.85910 7 542 2149.00000 1959.85910 8.80% 880 1221s
219
     1047
           580 1984.05339 33 776 2149.00000 1959.85910 8.80% 879 1229s
220
     1048
           581 2149,00000 262 824 2149,00000 1959,85910 8,80% 878 1235s
221
     1049
           581 1962.98458 26 287 2149.00000 1959.85910 8.80% 877 1255s
222
      1050
           582 1998.49206 32 499 2149.00000 1959.85910 8.80% 876 1262s
           583 2124.88889 263 632 2149.00000 1959.85910 8.80% 876 1273s
     1051
           583 2088 69841 254 789 2149 00000 1959 85910 8 80% 875 1280s
224
     1052
225
     1053
           584 2099.72588 195 834 2149.00000 1959.85910 8.80% 874 1287s
226
     1054
           585 2129.83333 111 834 2149.00000 1959.85910 8.80% 873 1293s
227
           585 2020.33333 93 834 2149.00000 1959.85910 8.80% 872 1300s
     1055
228
     1056
           589 1960.21568 13 799 2149.00000 1959.85910 8.80% 1034 1316s
229
     1058 592 1960.21568 14 734 2149.00000 1960.21568 8.78% 1041 1335s
230
     1062
           595 1961.77778
                          15 1194 2149.00000 1960.29943 8.78% 1059 1346s
           598 1960.79487 15 813 2149.00000 1960.79487 8.76% 1090 1352s
231
     1066
232
     1070 598 1960.79487 16 938 2149.00000 1960.79487 8.76% 1097 1357s
233
                          16 846 2149.00000 1960.79487 8.76% 1104 1360s
      1074
           601 1960,79487
234
     1084 610 1961.12121 17 821 2149.00000 1960.79487 8.76% 1102 1367s
235
     1090 612 1961.12121 18 764 2149.00000 1960.79487 8.76% 1100 1373s
236
     1094 615 1963.34343
                          18 841 2149.00000 1960.79487 8.76% 1114 1376s
                          20 1128 2149.00000 1960.79487 8.76% 1129 1387s
237
     1106 620 1961 33333
238
                          20 1118 2149 00000 1960 79487 8 76% 1144 1399s
     1112 624 1982 11111
239
     1120 627 1962.33333
                          21 933 2149.00000 1960.79487 8.76% 1156 1409s
240
     1125 630 2051.00000 21 972 2149.00000 1960.79487 8.76% 1182 1421s
241
     1130 632 1962.33333 22 1026 2149.00000 1960.79487 8.76% 1208 1426s
     1134 633 1962.33333 22 709 2149.00000 1960.79487 8.76% 1225 1431s
242
243
     1139 637 1962.33333 23 1026 2149.00000 1960.79487 8.76% 1230 1436s
244
     1146 641 1962.33333
                          24 1011 2149.00000 1960.79487 8.76% 1242 1444s
     1152 644 1963.38095 24 1000 2149.00000 1960.79487 8.76% 1262 1450s
245
     1175 657 1962.33333 26 1074 2149.00000 1960.79487 8.76% 1295 1461s
246
     1193 661 1962.33333 27 1002 2149.00000 1960.79487 8.76% 1306 1468s
247
```

```
248 H 1195 631
                          2089.0000000 1960.79487 6.14% 1306 1468s
     1209 625 1976.30577 27 1450 2089.00000 1960.79487 6.14% 1313 1479s
      1222 626 1964.04819 28 1366 2089.00000 1960.79487 6.14% 1332 1487s
250
251
      1227 630 1963.81481 28 1144 2089.00000 1960.79487 6.14% 1344 1493s
      1233 633 1963.81481 29 945 2089.00000 1960.79487 6.14% 1359 1500s
253
      1240 633 cutoff 30 2089.00000 1960.79487 6.14% 1380 1507s
      1247 638 1963.81481 31 910 2089.00000 1960.79487 6.14% 1392 1516s
254
255
      1263 634 1967.65312 32 2230 2089.00000 1960.79487 6.14% 1417 1524s
      1272 \quad 641 \ 1976.31481 \quad 33 \ 1222 \ 2089.00000 \ 1960.79487 \quad 6.14\% \quad 1435 \ 1534s
256
257
      1288 641 1976.31481 34 1198 2089.00000 1960.79487 6.14% 1444 1549s
258
     1303 644 2017.88274 35 1130 2089.00000 1960.79487 6.14% 1459 1557s
    H 1312 613
259
                          2069.0000000 1960.79487 5.23% 1465 1557s
260
     1313 620 1984.38964 36 1397 2069.00000 1960.79487 5.23% 1474 1564s
      1324 622 1979.05279 38 1248 2069.00000 1960.79487 5.23% 1503 1581s
261
262
      1349 617 1979.05279 39 1140 2069.00000 1960.79487 5.23% 1525 1602s
      1365 612 cutoff 40 2069.00000 1960.79487 5.23% 1544 1614s
      1379 610 1964.55556 17 730 2069.00000 1960.79487 5.23% 1577 1626s
264
      1395 610 1964.55556 18 831 2069.00000 1960.79487 5.23% 1588 1642s
265
266
      1413 607 1965.29630 20 663 2069.00000 1960.79487 5.23% 1614 1658s
267
      1426 614 1971.22222 22 607 2069.00000 1960.79487 5.23% 1652 1680s
      1440 615 1971.31780 24 624 2069.00000 1960.79487 5.23% 1682 1697s
268
      1472 603 2041.93651 30 514 2069.00000 1961.77778 5.18% 1693 1726s
269
270
           600 1972.33333 19 802 2069.00000 1961.77778 5.18% 1717 1749s
      1509
271
      1527
           590 1972.89701 21 2126 2069.00000 1961.77778 5.18% 1738 1773s
272
      1566 572 cutoff 24 2069.00000 1961.77778 5.18% 1751 1806s
273
      1602
           566 2053.44444 26 1297 2069.00000 1962.33333 5.16% 1787 1822s
           569 1969.81871 17 882 2069.00000 1962.33333 5.16% 1806 1853s
           564 2036.33929 24 689 2069.00000 1962.33333 5.16% 1820 1893s
275
      1688
           552 1972.30882 23 1436 2069.00000 1962.33333 5.16% 1828 1930s
276
      1752
277
      1821 535 1969.53634 21 1170 2069.00000 1962.33333 5.16% 1839 1953s
278
      1844
           537 infeasible 24
                              2069.00000 1962.33333 5.16% 1882 1977s
279
           534 1970.09039 22 1863 2069.00000 1962.33333 5.16% 1921 2006s
      1873
280
      1901 534 1997.43556 25 1248 2069.00000 1962.33333 5.16% 1966 2072s
           526 1966.49835 19 2389 2069.00000 1962.33333 5.16% 2014 2145s
281
      1943
282
      1984
           524 cutoff 20 2069.00000 1962.33333 5.16% 2015 2233s
           521 2006.85850 26 1468 2069.00000 1962.33333 5.16% 2043 2283s
283
      2020
284
      2098
           497 1974.99893 24 1205 2069.00000 1962.33333 5.16% 2033 2352s
      2168 480 1988.16667 20 446 2069.00000 1962.72853 5.14% 2035 2398s
285
     2223 466 cutoff 23
2263 457 cutoff 23
                             2069.00000 1963.28571 5.11% 2048 2436s
286
287
                             2069.00000 1963.38095 5.10% 2091 2471s
288
      2324 441 1969.78145 21 1323 2069.00000 1963.38095 5.10% 2107 2525s
289
      2380 425 1987.46470 24 1562 2069.00000 1963.53439 5.10% 2139 2570s
290
      2443 412 infeasible 26 2069.00000 1963.92169 5.08% 2167 2616s
291
      2523 379 1972.70370 23 956 2069.00000 1964.21621 5.06% 2173 2657s
           363 1987.05556 22 992 2069.00000 1964.55556 5.05% 2193 2698s
292
      2690 354 1982.33333 20 974 2069.00000 1964.76923 5.04% 2214 2735s
293
294
           360 1972.33333 20 201 2069.00000 1965.40274 5.01% 2235 2781s
      2767
295
      2849
           366 1979.00000 23 1075 2069.00000 1965.66667 4.99% 2253 2818s
      2899 377 1998.38466 28 1994 2069.00000 1965.66667 4.99% 2296 2860s
296
      2956 377 1969.60456 21 834 2069.00000 1965.66667 4.99% 2343 2907s
297
298
      3037
           379 1996.33333 23 724 2069.00000 1965.66667 4.99% 2385 2959s
      3134 386 2029.00000 25 375 2069.00000 1966.14747 4.97% 2409 3006s
299
300
           392 1980.89428 26 2103 2069.00000 1966.77777 4.94% 2423 3063s
      3233
      3340 393 1979.00000 23 429 2069.00000 1967.06658 4.93% 2444 3130s
301
302
      3496 402 1990.26436 24 1709 2069.00000 1967.88889 4.89% 2439 3182s
303
      3611 402
                cutoff 24
                             2069.00000 1968.93884 4.84% 2451 3240s
                 cutoff 24
                             2069.00000 1969.00000 4.83% 2485 3291s
304
      3711 410
      3891 413 2042.57978 28 669 2069.00000 1969.33621 4.82% 2459 3350s
305
306
      4045
           409 1991.19506 23 1342 2069.00000 1969.74074 4.80% 2461 3419s
      4146 417 1971.55722 23 2114 2069.00000 1969.95646 4.79% 2501 3489s
307
      4251 410 1971.14784 24 1413 2069.00000 1970.24716 4.77% 2520 3596s
308
309
      4403 400 cutoff 26 2069.00000 1971.26780 4.72% 2526 3676s
      4499 400 1989.60762 25 1789 2069.00000 1972.33333 4.67% 2555 3767s
311
      4620 393 cutoff 30 2069.00000 1972.57565 4.66% 2584 3857s
           376 1985.85897 31 1039 2069.00000 1974.76384 4.55% 2604 3945s
312
      4794
      4979 357 1979.04167 28 788 2069.00000 1977.04864 4.44% 2622 4039s
313
314
      5157
                cutoff 23
                             2069.00000 1978.33678 4.38% 2642 4151s
315
      5373
           335 2009.13383 28 2152 2069.00000 1981.01400 4.25% 2644 4258s
316
      5545 319 2014.39036 28 1461 2069.00000 1982.33333 4.19% 2659 4361s
           290 cutoff 25 2069.00000 1984.82192 4.07% 2654 4486s
      5790
      6044 261 1997.73377 24 1351 2069.00000 1987.24639 3.95% 2640 4601s
318
319
      6272
           202 2052.27294 36 1481 2069.00000 1992.33333 3.71% 2652 4734s
320
           169 2002.33333 21 924 2069.00000 2001.66667 3.25% 2630 5326s
      6584
      6864 106 2007.50000 23 908 2069.00000 2001.80164 3.25% 2624 5423s
321
      7240 23 2013.00536 25 1538 2069.00000 2008.33333 2.93% 2569 5506s
322
323
      7539
           0 cutoff 25 2069.00000 2054.43254 0.70% 2544 5524s
324
325
    Cutting planes:
326
     Learned: 28
327
      Gomory: 47
328
      Cover: 416
      Implied bound: 117
329
330
     Projected implied bound: 6
331
      Clique: 126
```

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unknown
332
      MIR: 114
333
       StrongCG: 55
334
      Flow cover: 293
335
      GUB cover: 149
336
      Inf proof: 9
337
       Zero half: 241
      RLT: 34
338
339
      Relax-and-lift: 31
340
      BQP: 23
341
342 Explored 7624 nodes (19489369 simplex iterations) in 5524.98 seconds (8802.79 work units)
343 Thread count was 8 (of 8 available processors)
344
345 Solution count 5: 2069 2089 2149 ... 2189
346
347 Optimal solution found (tolerance 1.00e-04)
348 Best objective 2.069000000000e+03, best bound 2.06900000000e+03, gap 0.0000%
349 Optimal Obj: 2069.0
350 Obj = 2069.0
351
     Solutions
352
     Vessel i: 0:
                                      ai-di: 5-31,
                                                                                      taoPi_SP-deltaPi_SP: 5-14, periodPi: 9,
                                                                                                                                 betaNi: 16,
                                                                                                                                                       Txijt:
                   li: 6,
                           pi: 8-14,
                                                    taoi-deltai: 5-31,
                                                                        periodi: 26,
                                                                                                                                             bi: 26,
            o1i: 156, o2i: 180, o3i: -442, o4i: 320, Ti: 214
      156,
     Vessel i: 1:
                  li: 7,
                           pi: 14-21,
                                        ai-di: 10-36,
                                                       taoi-deltai: 10-33,
                                                                                          taoPi_SP-deltaPi_SP: 10-22,
                                                                                                                        periodPi: 12,
                                                                                                                                       betaNi: 14,
                                                                                                                                                     bi: 23,
                                                                           periodi: 23,
      Txijt: 161,
                   o1i: 161, o2i: 240, o3i: -297, o4i: 280, Ti: 384
                           pi: 27-34,
354 Vessel i: 2:
                                                                                                                        periodPi: 11,
                                        ai-di: 14-42,
                                                                                          taoPi_SP-deltaPi_SP: 14-25,
                                                                                                                                       betaNi: 11,
                                                                                                                                                     bi: 22,
                   li: 7,
                                                      taoi-deltai: 14-36,
                                                                            periodi: 22,
      Txijt: 154,
                   o1i: 154, o2i: 220,
                                        o3i: -297, o4i: 220, Ti: 297
                           pi: 0-6, ai-di: 17-31,
                                                                                       taoPi_SP-deltaPi_SP: 17-24, periodPi: 7, betaNi: 14,
     Vessel i: 3:
                  li: 6,
                                                    taoi-deltai: 17-31,
                                                                         periodi: 14,
                                                                                                                                                 bi: 14,
                           o2i: 140,
                                      o3i: -182, o4i: 280, Ti: 322
      Txijt: 84, o1i: 84,
                                        ai-di: 24-45,
                                                                                          taoPi_SP-deltaPi_SP: 24-33,
     Vessel i: 4:
                  li: 5,
                           pi: 22-27,
                                                      taoi-deltai: 24-41,
                                                                           periodi: 17,
                                                                                                                        periodPi: 9,
                                                                                                                                      betaNi: 9,
                                                                                                                                                   bi: 17,
     Txijt: 85,
                o1i: 85,
                           o2i: 180,
                                      o3i: -200, o4i: 180, Ti: 245
     Vessel i: 5: li: 6,
                           pi: 14-20,
                                       ai-di: 35-55, taoi-deltai: 35-49,
                                                                           periodi: 14,
                                                                                         taoPi SP-deltaPi SP: 35-42,
                                                                                                                        periodPi: 7,
                                                                                                                                      betaNi: 7,
                                                                                                                                                   bi: 14.
      Txijt: 84, o1i: 84,
                           o2i: 140,
                                      o3i: -182, o4i: 140, Ti: 182
                           pi: 7-14,
358
     Vessel i: 6:
                  li: 7,
                                       ai-di: 40-72, taoi-deltai: 40-70,
                                                                          periodi: 30,
                                                                                        taoPi_SP-deltaPi_SP: 40-55,
                                                                                                                       periodPi: 15,
                                                                                                                                      betaNi: 16,
                                                                                                                                                    bi: 30,
                  o1i: 210, o2i: 300, o3i: -405,
                                                     o4i: 320, Ti: 425
      Txijt: 210,
     TimeSolveModel: 5557.000000
360
361
362
363 TimeAll: 5561.000000
364
365
366
367
```