```
D:\Python\Python\setroute\python.exe "D:\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Python\Pyt
       mode=client --port=7962
  2
  3
       import sys; print('Python %s on %s' % (sys.version, sys.platform))
       paper', 'E:/1 | 0 | 0/3 | 0 | 0/1 | 0 | 0 | 0/1 | 0 | 0 | 0/1 | 0 | 0 | 0/1 | 0 | 0 | 0/1 | 0 | 0 | 0/1 | 0 | 0 | 0/1 | 0 | 0/1 | 0 | 0/1 | 0 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 0/1 | 
  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
       main_DM.py', wdir='E:/1 000/3 00000/1 000000/1 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
10
       Backend TkAgg is interactive backend. Turning interactive mode on.
11
       Waiting 5s.....
       Optimize the ./R_7_7.xlsx instance
13
14
15
       Set parameter TimeLimit to value 1200
16
       Set parameter PoolSolutions to value 3
17
18
       Set parameter PoolGap to value 0.05
        Set parameter PoolSearchMode to value 2
19
20
       Gurobi Optimizer version 11.0.0 build v11.0.0rc2 (win64 - Windows 10.0 (19045.2))
21
22 CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
       Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
24
       Optimize a model with 133301 rows, 56000 columns and 390789 nonzeros
25
26
       Model fingerprint: 0xb6c839f9
        Variable types: 0 continuous, 56000 integer (47131 binary)
      Coefficient statistics:
28
29
         Matrix range [1e+00, 5e+05]
30
         Objective range [1e+00, 1e+00]
         Bounds range [1e+00, 1e+00]
31
32
         RHS range
                                       [1e+00, 7e+06]
33
       Presolve removed 114073 rows and 2527 columns
       Presolve time: 0.16s
       Presolved: 19228 rows, 53473 columns, 55435 nonzeros
35
36
        Variable types: 0 continuous, 53473 integer (44611 binary)
       Root relaxation: objective 4.149222e+02, 2220 iterations, 0.06 seconds (0.15 work units)
38
39
40
            Nodes | Current Node | Objective Bounds
41
        Expl Unexpl | Obj Depth IntInf | Incumbent BestBd Gap | It/Node Time
42
43
                     0 414.92216 0 1645
                                                                           - 414.92216
                                                   836.0000000 414.92216 50.4% -
44
      Η
             0
                       0
45
      H = 0
                       0
                                                   682.0000000 414.92216 39.2%
                                                                                                                            1s
                     46
             0
47
                     0 444.12702
                                                0 1642 682.00000 444.12702 34.9%
                     0\ 453.82638\quad 0\ 1393\ 682.00000\ 453.82638\ 33.5\%
48
49
                                                0 1375 682.00000 454.54486 33.4%
             0
                     0 454.54486
                                                                                                                                       88
                                                  0 1584 682,00000 454,77027 33,3%
50
             0
                     0 454.77027
                                                                                                                                       95
51
                     0 454.79113
                                                  0 1584 682.00000 454.79113 33.3%
52
                     0 454.79158
                                                  0 1584 682.00000 454.79158 33.3%
                                                  0 1186 682.00000 457.72357 32.9%
53
                     0 457.72357
                                                                                                                                 - 10s
             0
54
                     0 461.65450
                                                  0 1377 682.00000 461.65450 32.3%
                                                                                                                                 - 11s
55
                      0 463.24364
                                                   0 1156 682.00000 463.24364 32.1%
                                                                                                                                      11s
56
                     0 463.31184 0 1381 682.00000 463.31184 32.1%
             0
                                                                                                                                 - 12s
                                                0 1380 682.00000 463.31184 32.1%
57
             0
                     0 463.31184
                                                                                                                                 - 12s
58
             0
                     0 464.59806
                                                  0 1230 682.00000 464.59806 31.9%
                                                                                                                                 - 12s
                     0 464.86622
                                                0 1254 682.00000 464.86622 31.8%
60
                     0 464.90144
                                                0 1253 682,00000 464,90144 31.8%
             0
                                                                                                                                 - 14s
61
             0
                     0 464.90211 0 1303 682.00000 464.90211 31.8%
                                                                                                                                 - 14s
                     0 465.05992
                                                  0 1156 682.00000 465.05992 31.8%
63
             0
                     0 465.15003
                                                  0 1191 682.00000 465.15003 31.8%
                                                                                                                                 - 16s
                     0.465.36752
                                                  0 1186 682.00000 465.36752 31.8%
64
             0
                                                                                                                                - 16s
65
                     0.465.39971
                                                  0 954 682.00000 465.39971 31.8%
                                                                                                                               - 17s
                                                  0 920 682.00000 465.39971 31.8%
66
                      1 465.39971
                     32 467.29286 8 1226 682.00000 466.45569 31.6% 322 26s
            28
67
68
         1100 1123 502.12588 243 1019 682.00000 466.45569 31.6% 23.3 30s
          3151 2972 629.04550 339 954 682.00000 466.82471 31.6% 23.2
70
         3153 2973 662.00000 568 1245 682.00000 662.00000 2.93% 23.2 42s
         3157 2976 667.37895 504 131 682.00000 667.37895 2.14% 23.2 45s
72
       H 3165 2831
                                                          681.0000000 669.48606 1.69% 23.1 46s
         3171 2693 673.97584 392 114 681.00000 673.97584 1.03% 23.1
74
         3184 2567 678.53383 442 84 681.00000 678.53383 0.36% 23.0 55s
         3202 2579 679.77390 292 77 681.00000 679.77390 0.18% 22.8 60s
75
76
77
       Cutting planes:
         Learned: 240
78
79
         Gomory: 7
80
         Lift-and-project: 6
```

```
unknown
  81
       Cover: 1
  82
       Implied bound: 4
       Projected implied bound: 2
  83
  84
       MIR: 148
  85
       StrongCG: 190
       Flow cover: 105
  86
       Zero half: 3
  87
  88
       RLT: 41
  89
       Relax-and-lift: 644
  90
  91
     Explored 3202 nodes (114357 simplex iterations) in 60.48 seconds (73.77 work units)
  92
      Thread count was 8 (of 8 available processors)
  94
      Solution count 3: 681 681 681
 95
     No other solutions better than 681
  96
  97
      Optimal solution found (tolerance 1.00e-04)
 98
     Best objective 6.810000000000e+02, best bound 6.81000000000e+02, gap 0.0000%
  99
 100 Output optimal solution and the Optimal Obj: 681.0
101
102
103 \text{ Obj} = 681.0
104
105 Solutions:
106
         The total pi = 126.0
107
         The total duration time in berth stage = 123.0
         The total duration time in quay crane scheduling stage = 24.0
108
109
         The total departure time in berth stage= 390.0
110
         The total departure time in quay crane scheduling stage = 291.0
111
         The total wasted crane work hour according QC0= 7.912711838691569
         The last depature time in quay crane scheduling stage = 69.0
112
113
114 The specific solution are as follows:
                                   pi: 14-20,
                                                                                     taoi-deltai: 40-60,
                                                                                                                      periodi: 20,
115
        Vessel i: 0:
                      li: 6,
                                                            ai-di: 40-60,
                                                                                                                                                    taoPi_SP-
      deltaPi_SP: 40-44,
                                                                              c_i: 5228251,
                                           periodPi: 4,
                                                                                                                   dowork: 5272880,
                                                                                                                                                                fa_i: 5
116
        Vessel i: 1:
                      li: 4,
                                    pi: 24-28,
                                                             ai-di: 65-84,
                                                                                     taoi-deltai: 65-84,
                                                                                                                      periodi: 19,
                                                                                                                                                    taoPi_SP-
      deltaPi SP: 65-69,
                                                                                                                   dowork: 4877414,
                                           periodPi: 4,
                                                                              c i: 4785088,
                                                                                                                                                                fa_i: 4
        Vessel i: 2:
                                    pi: 24-30,
                                                            ai-di: 27-54,
                                                                                     taoi-deltai: 27-54,
                                                                                                                      periodi: 27,
                                                                                                                                                    taoPi SP-
117
                      li: 6,
                                           periodPi: 6,
      deltaPi_SP: 27-33,
                                                                              c_i: 6986991,
                                                                                                                   dowork: 7118388,
                                                                                                                                                                fa_i: 3
         Vessel i: 3:
                       li: 5,
                                   pi: 28-33,
                                                            ai-di: 62-76,
                                                                                     taoi-deltai: 62-76,
                                                                                                                      periodi: 14,
                                                                                                                                                    taoPi_SP-
      deltaPi SP: 62-65,
                                           periodPi: 3,
                                                                              c i: 3642623,
                                                                                                                   dowork: 3954660,
                                                                                                                                                                fa_i: 3
        Vessel i: 4: li: 4,
119
                                                            ai-di: 39-58,
                                                                                                                      periodi: 16,
                                                                                                                                                    taoPi_SP-
                                    pi: 20-24,
                                                                                     taoi-deltai: 39-55,
      deltaPi_SP: 39-42,
                                           periodPi: 3,
                                                                              c i: 4163453,
                                                                                                                   dowork: 4218304,
                                                                                                                                                                fa i: 4
        Vessel i: 5:
                                   pi: 7-14,
                                                          ai-di: 25-49,
                                                                                                                   periodi: 17,
                                                                                                                                                 taoPi_SP-deltaPi_SP
 120
                       li: 7,
                                                                                   taoi-deltai: 25-42,
                                                                   c_i: 4423517,
                                                                                                                                                      fa_i: 7
                                 periodPi: 2,
                                                                                                         dowork: 4745592,
       25-27.
                                                          ai-di: 9-21,
                                                                                                                 periodi: 10,
121
                                   pi: 9-14,
                                                                                taoi-deltai: 9-19,
                                                                                                                                               taoPi_SP-deltaPi_SP: 9
        Vessel i: 6:
                       li: 5,
      -11,
                               periodPi: 2,
                                                                 c_i: 2562192,
                                                                                                       dowork: 3691016,
                                                                                                                                                    fa_i: 5
     TimeSolveModel: 68.000000
123
     TimeAll: 71.000000
124
125
126
```