```
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=50853
 2
 3
     import sys; print('Python %s on %s' % (sys.version, sys.platform))
      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 8 9.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 171112 rows, 64136 columns and 503224 nonzeros
25
26
     Model fingerprint: 0x085afa48
      Variable types: 0 continuous, 64136 integer (54000 binary)
     Coefficient statistics:
28
29
       Matrix range [1e+00, 5e+05]
30
       Objective range [1e+00, 1e+00]
31
       Bounds range [1e+00, 1e+00]
32
       RHS range
                               [1e+00, 6e+06]
33
     Presolve removed 149664 rows and 2951 columns
     Presolve time: 0.10s
      Presolved: 21448 rows, 61185 columns, 61805 nonzeros
35
36
      Variable types: 0 continuous, 61185 integer (51057 binary)
     Root relaxation: objective 4.105857e+02, 2359 iterations, 0.12 seconds (0.22 work units)
38
39
40
          Nodes | Current Node | Objective Bounds
41
      Expl Unexpl | Obj Depth IntInf | Incumbent BestBd Gap | It/Node Time
42
43
                0 410.58566 0 1822
                                                            - 410.58566
                                        872.0000000 410.58566 52.9% -
44
     Η
          0
                  0
45
     H = 0
                  0
                                        668.0000000 410.58566 38.5%
                                                                                                  1s
                 0 431.59555  0 1704 668.00000 431.59555 35.4%
46
          0
47
                 0 460.82933
                                        0 1546 668.00000 460.82933 31.0%
                 48
49
                                       0 1687 668.00000 460.82933 31.0%
          0
                 0 460.82933
                                                                                                            5s
                                       0 1383 668.00000 461.56366 30.9%
50
          0
                 0 461.56366
51
                 0 462.56298
                                       0 1759 668.00000 462.56298 30.8%
52
                 0 462.58171
                                        0 1758 668.00000 462.58171 30.8%
                                                                                                           6s
53
                                       0 1758 668.00000 462.58171 30.8%
                 0 462.58171
          0
                                                                                                            6s
54
                 0\ 463.08236\quad 0\ 1445\ 668.00000\ 463.08236\ 30.7\%
55
                 0 463.08236
                                       0 1233 668.00000 463.08236 30.7%
                 56
       1417\ 1422\ 513.14175\ 350\ 785\ 668.00000\ 463.08236\ 30.7\%\ 21.8
57
58
       3425 3407 618.56687 778 474 668.00000 463.08236 30.7% 22.5
       3969 3346 651.00000 206 1296 668.00000 651.00000 2.54% 22.2
60
       3970 3180 651.00000 227 1294 668.00000 651.00000 2.54% 22.2 32s
61
     H 3970 3021
                                              667.0000000 651.00000 2.40% 22.2 32s
       3978 2875 660.00000 94 352 667.00000 660.00000 1.05% 22.1 35s
63
       3992 2885 660.00000 135 254 667.00000 660.00000 1.05% 22.0 40s
       4002 2891 660.00000 239 184 667.00000 660.00000 1.05% 22.0 45s
64
65
66
     Cutting planes:
       Learned: 2
67
68
       Gomory: 7
69
       Implied bound: 2
70
       MIR: 1
       StrongCG: 2
71
72
       Flow cover: 19
       Zero half: 1
74
       RLT: 3
       Relax-and-lift: 12
75
      Explored 4023 nodes (131550 simplex iterations) in 48.11 seconds (54.82 work units)
     Thread count was 8 (of 8 available processors)
80
     Solution count 3: 667 667 667
```

```
81 No other solutions better than 667
 82
     Optimal solution found (tolerance 1.00e-04)
 83
     Best objective 6.670000000000e+02, best bound 6.67000000000e+02, gap 0.0000%
 84
 86
     Output optimal solution and the Optimal Obj: 667.0
 87
 88
 89
     Obj = 667.0
 90
 91 Solutions:
 92
        The total pi = 130.0
 93
        The total duration time in berth stage = 135.0
 94
        The total duration time in quay crane scheduling stage = 26.0
 95
        The total departure time in berth stage= 388.0
 96
        The total departure time in quay crane scheduling stage = 279.0
 97
        The total wasted crane work hour according QC0= 12.90386657765775
 98
        The last depature time in quay crane scheduling stage = 61.0
 99
100
     The specific solution are as follows:
                                                                                                                      periodi: 25,
        Vessel i: 0: li: 4,
                                   pi: 17-21,
                                                                                     taoi-deltai: 56-81,
                                                                                                                                                    taoPi_SP-
101
                                                            ai-di: 56-81,
                                           periodPi: 5,
     deltaPi_SP: 56-61,
                                                                                                                   dowork: 6459278,
                                                                              c_i: 6377423,
                                                                                                                                                                 fa_i: 4
102
        Vessel i: 1:
                      li: 7,
                                   pi: 22-29,
                                                            ai-di: 0-9,
                                                                                   taoi-deltai: 0-9,
                                                                                                                 periodi: 9,
                                                                                                                                             taoPi_SP-deltaPi_SP: 0-2
                         periodPi: 2,
                                                            c i: 2335732,
                                                                                                  dowork: 3954660,
                                                                                                                                               fa_i: 6
                       li: 7,
                                                                                     taoi-deltai: 33-57,
                                                                                                                      periodi: 24.
103
        Vessel i: 2:
                                                                                                                                                    taoPi SP-
                                   pi: 21-28,
                                                            ai-di: 33-57,
     deltaPi_SP: 33-37,
                                          periodPi: 4,
                                                                              c_i: 6133829,
                                                                                                                    dowork: 6327456,
                                                                                                                                                                 fa_i: 5
        Vessel i: 3:
                                   pi: 7-14,
                                                          ai-di: 24-37,
                                                                                   taoi-deltai: 24-37,
                                                                                                                   periodi: 13,
                                                                                                                                                  taoPi_SP-deltaPi_SP
                      li: 7,
                                                                    c_i: 3192893,
                                 periodPi: 2,
                                                                                                          dowork: 4218304,
      24-26.
                                                                                                                                                      fa i: 6
105
                                                                                                                                                  taoPi_SP-deltaPi_SP
        Vessel i: 4:
                      li: 6,
                                   pi: 7-13,
                                                          ai-di: 42-61,
                                                                                   taoi-deltai: 42-61,
                                                                                                                   periodi: 19,
                                                                    c_i: 4985448,
     : 42-46,
                                 periodPi: 4,
                                                                                                          dowork: 5009236,
                                                                                                                                                      fa_i: 6
        Vessel i: 5:
                      li: 6,
                                   pi: 28-34,
                                                            ai-di: 40-59,
                                                                                     taoi-deltai: 40-59,
                                                                                                                      periodi: 19,
                                                                                                                                                    taoPi_SP-
     deltaPi_SP: 40-44,
                                          periodPi: 4,
                                                                              c i: 4752884,
                                                                                                                    dowork: 4877414,
                                                                                                                                                                 fa i: 3
                                                                                                                                                  taoPi_SP-deltaPi_SP
107
        Vessel i: 6:
                      li: 4,
                                   pi: 13-17,
                                                            ai-di: 51-59,
                                                                                     taoi-deltai: 51-59,
                                                                                                                      periodi: 8,
      51-54,
                                 periodPi: 3,
                                                                    c_i: 1986730,
                                                                                                          dowork: 2109152,
                                                                                                                                                      fa_i: 2
                                                                                                                   periodi: 18,
108
                       li: 7,
                                   pi: 15-22,
                                                            ai-di: 7-35,
                                                                                   taoi-deltai: 7-25,
                                                                                                                                                  taoPi SP-deltaPi SP
        Vessel i: 7:
                                                                                                       dowork: 4745592,
                              periodPi: 2,
                                                                                                                                                    fa_i: 7
      7-9
                                                                 c_i: 4534126,
109
    TimeSolveModel: 56.000000
110
111 TimeAll: 60.000000
112
113
```