```
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=55238
 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_LW_0001/4 0000/3 python_code/9 Code for this
10
      Backend TkAgg is interactive backend. Turning interactive mode on.
11
      Waiting 5s.....
      Optimize the ./R 5 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 71827 rows, 39860 columns and 208375 nonzeros
25
26
      Model fingerprint: 0xeaf4a5cd
       Variable types: 0 continuous, 39860 integer (33525 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
        RHS range
                                   [1e+00, 7e+06]
33
      Presolve removed 58548 rows and 1606 columns
      Presolve time: 0.11s
35
      Presolved: 13279 rows, 38254 columns, 37923 nonzeros
36
       Variable types: 0 continuous, 38254 integer (31924 binary)
      Found heuristic solution: objective 677.0000000
38
39
      Root relaxation: objective 2.893247e+02, 1792 iterations, 0.07 seconds (0.14 work units)
40
41
           Nodes | Current Node | Objective Bounds
        Expl\ Unexpl\ |\ Obj\ Depth\ IntInf\ |\ Incumbent \quad BestBd\ Gap\ |\ It/Node\ Time
42
43
                  44
45
     H \quad 0 \quad 0
                                             469.0000000 289.32473 38.3%
                  0 304.48666  0 1369  469.00000  304.48666  35.1%
46
           0
                                                                                                                        2s
47
                   0 330.41929
                                           0 1187 469.00000 330.41929 29.5%
                   0\ 330.45053\quad 0\ 1369\ 469.00000\ 330.45053\ 29.5\%
48
                                           0 1101 469.00000 330.52584 29.5%
49
           0
                   0 330.52584
                                                                                                                        7s
50
           0
                   0 331.55914
                                           0 1325 469.00000 331.55914 29.3%
                                                                                                                        9s
51
                   52
                   53
                   - 10s
           0
54
                   0 332.22203
                                            0 1120 469.00000 332.22203 29.2%
                                                                                                                 - 11s
55
                   0 332.22885
                                             0\ 972\ 469.00000\ 332.22885\ 29.2\%
56
                   0 332.23547
                                           0 1110 469.00000 332.23547 29.2%
                                                                                                                  - 11s
                   0 332.28708
57
           0
                                           0 1036 469.00000 332.28708 29.1%
                                                                                                                  - 11s
58
           0
                   0 332.35713
                                             0 1100 469.00000 332.35713 29.1%
                                                                                                                  - 11s
                  60
                   2 334,00000 0 893 469,00000 334,00000 28.8%
                                                                                                                 - 13s
61
          606 658 334.09128 137 795 469.00000 334.00000 28.8% 7.8 15s
        2774 2592 441.00000 266 1110 469.00000 441.00000 5.97% 10.8 22s
63
        2790 2605 461.00000 83 95 469.00000 461.00000 1.71% 17.4 25s
      H 2794 2477
                                                   468.0000000 466.00000 0.43% 17.4 25s
64
65
      Optimal solution found at node 2795 - now completing solution pool...
66
        2796 2354 468.00000 124 0 469.00000 468.00000 0.21% 17.3 25s
67
68
69
       Explored 2801 nodes (63230 simplex iterations) in 25.98 seconds (30.70 work units)
70
      Thread count was 8 (of 8 available processors)
72
       Solution count 3: 468 468 468
      No other solutions better than 468
      Optimal solution found (tolerance 1.00e-04)
75
76
      Best objective 4.680000000000e+02, best bound 4.68000000000e+02, gap 0.0000%
     Output optimal solution and the Optimal Obj: 468.0
78
79
80
```

```
unknown
 81 Obj = 468.0
  82
  83 Solutions:
 84
         The total pi = 83.0
  85
         The total duration time in berth stage = 105.0
         The total duration time in quay crane scheduling stage = 27.0
 86
 87
         The total departure time in berth stage= 273.0
         The total departure time in quay crane scheduling stage = 195.0
 88
  89
         The total wasted crane work hour according QC0= 1.6437923867032818
  90
         The last depature time in quay crane scheduling stage = 62.0
 91
 92
     The specific solution are as follows:
                                                                                     taoi-deltai: 17-37,
                                                                                                                     periodi: 20,
 93
        Vessel i: 0:
                      li: 5,
                                   pi: 22-27,
                                                            ai-di: 17-39,
                                                                                                                                                   taoPi SP-
      deltaPi_SP: 17-23,
                                           periodPi: 6,
                                                                             c_i: 5186037,
                                                                                                                   dowork: 5272880,
                                                                                                                                                               fa_i: 2
                                   pi: 21-26,
                                                                                                                                                   taoPi_SP-
        Vessel i: 1: li: 5,
                                                            ai-di: 43-72,
                                                                                     taoi-deltai: 43-70,
                                                                                                                     periodi: 27,
      deltaPi_SP: 43-49,
                                           periodPi: 6,
                                                                              c_i: 7000335,
                                                                                                                   dowork: 7118388,
                                                                                                                                                               fa_i: 3
        Vessel i: 2: li: 4,
                                   pi: 17-21,
                                                            ai-di: 58-80,
                                                                                     taoi-deltai: 58-78,
                                                                                                                     periodi: 20,
                                                                                                                                                   taoPi SP-
      deltaPi_SP: 58-62,
                                           periodPi: 4,
                                                                                                                   dowork: 5141058,
                                                                              c_i: 5011582,
                                                                                                                                                               fa_i: 4
                                                                                                                                                   taoPi_SP-
        Vessel i: 3: li: 7,
                                   pi: 14-21,
                                                            ai-di: 26-58,
                                                                                     taoi-deltai: 26-54,
                                                                                                                     periodi: 28,
      deltaPi SP: 26-34,
                                          periodPi: 8,
                                                                              c i: 7330053,
                                                                                                                   dowork: 7382032,
                                                                                                                                                               fa i: 2
        Vessel i: 4:
                                   pi: 9-14,
                                                                                                                   periodi: 10,
                                                                                                                                                taoPi_SP-deltaPi_SP
                                                          ai-di: 24-41,
                                                                                  taoi-deltai: 24-34,
                     li: 5,
                                                                    c_i: 2457593,
       24-27,
                                 periodPi: 3,
                                                                                                         dowork: 2504618,
                                                                                                                                                     fa_i: 2
     TimeSolveModel: 33.000000
100 TimeAll: 36.000000
101
102
```