```
this paper\Scripts\python.exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=
 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
     >>> runfile('E:/1 = 1 = 3 = 0 = 0/1 = 0 = 0 = 0/1 = 0 = 0 = 0/1 = 0 = 0/1 = 0 = 0/1 = 0 = 0/1 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 0/2 = 
     Backend TkAgg is interactive backend. Turning interactive mode on.
      Waiting 5s.....
12
     Optimize the ./R_30_1.xlsx instance by BDC
13
14
15
             Master protblem status = 2, is Optimal
             sol_MP_obj = 852.0
16
     The initial lb = -inf
17
                                        ub = inf
19
     The current iteration cnt = 0
20
         Optimization was stopped with status 9
21
             Dual problem status = 9
             Add optimal cut
23
             Master protblem status = 2, is Optimal
24
             Deterministic Sub problem Status= 2, is Optimal
2.5
             1b = 886.1225192083384
                                                                    ub = 886.1225192083384
26
            MPObj = 886.1225192083384 MPObj Remove Hua = 879.0
                                                                                                             DualSPObj = 7.122519208338376
                                                                                                                                                                    Hua = 7.1225192083383755
      Deterministic\_SP\_SPObj = 749.0
2.7
28
     ub - 1b = 0.0
29
     Iteration cycle stopped by termination criterion 1: Because ub - 1b \le eps, the iteration stop, and eps cm = 0
30
31
          i: 0.0 l_i: 4.0 p_i: 4.0 al_i: 16.0 sol_a_i: 16.0 sol_g_i: 0.0 d_i: 23.0 sol_taoi: 16.0
                                                                                                                                                       sol deltai: 22.0 sol deltai - sol taoi: 6.0 sol taoP:
               sol_deltaP: 18.0 sol_deltaP - sol_taoP: 2.0 cl_i: 1581864.0 sol_c_i: 1581864.0 sol_gp_i: 0.0 total work: 1581864.0 wasted work: 0.0
         i: 1.0 l_i: 4.0 p_i: 0.0 al_i: 10.0 sol_a_i: 10.0 sol_g_i: 0.0 d_i: 20.0 sol_taoi: 10.0 sol_deltai: 19.0 sol_deltai - sol_taoi: 9.0 sol_taoi: 0.0 sol_deltaP - sol_taoP: 3.0 cl_i: 2372796.0 sol_c_i: 2372796.0 sol_gp_i: 0.0 total work: 2372796.0 wasted work: 0.0
                                                                   sol_a_i: 10.0 sol_g_i: 0.0 d_i: 20.0 sol_taoi: 10.0 sol_deltai: 19.0 sol_deltai - sol_taoi: 9.0 sol_taoP:
32
          i: 2.0 [i: 4.0 p_i: 23.0 al_i: 13.0 sol_a_i: 13.0 sol_g_i: 0.0 d_i: 18.0 sol_taoi: 13.0 sol_deltai: 18.0 sol_deltai: 18.0 sol_deltai: 5.0 sol_taoP
33
     : 13.0 sol_deltaP: 14.0 sol_deltaP - sol_taoP: 1.0 cl_i: 1318220.0 sol_c_i: 1318220.0 sol_gp_i: 0.0 total work: 1318220.0 wasted work: 0.0 i: 3.0 l_i: 5.0 p_i: 4.0 al_i: 5.0 sol_ai: 5.0 sol_g i: 0.0 d_i: 14.0 sol_taoi: 5.0 sol_deltai: 12.0 sol_deltai: 12.0 sol_deltai: 7.0 sol_taoP: 5.0
34
          sol_deltaP: 7.0 sol_deltaP - sol_taoP: 2.0 cl_i: 1845508.0 sol_c_i: 1845508.0 sol_gp_i: 0.0 total work: 2109152.0 wasted work: 1.0
     i: 4.0 1_i: 5.0 p_i: 24.0 al_i: 21.0 sol_a_i: 21.0 sol_g_i: 0.0 d_i: 24.0 sol_taoi: 21.0 sol_deltai: 25.0 sol_deltai - sol_taoi: 4.0 sol_taoi: 21.0 sol_deltai - sol_taoi: 4.0 sol_taoi:
          i: 5.0 l_i: 6.0 p_i: 0.0 al_i: 25.0
                                                                   sol_a_i: 25.0 sol_g_i: 0.0 d_i: 32.0 sol_taoi: 25.0 sol_deltai: 34.0 sol_deltai - sol_taoi: 9.0 sol_taoP:
36
                sol_deltaP: 28.0 sol_deltaP - sol_taoP: 3.0 cl_i: 2372796.0 sol_c_i: 2372796.0 sol_gp_i: 0.0 total work: 2372796.0 wasted work: 0.0
                                                                      sol_a_i: 4.0 sol_g_i: 0.0 d_i: 7.0 sol_taoi: 4.0 sol_deltai: 9.0 sol_deltai - sol_taoi: 5.0 sol_taoP: 4.0
37
          i: 6.0 1_i: 4.0 p_i: 26.0 aI_i: 4.0
          sol_deltaP: 5.0 sol_deltaP - sol_taoP: 1.0 cl_i: 1318220.0 sol_c_i: 1318220.0 sol_gp_i: 0.0 total work: 1318220.0 wasted work: 0.0
                                                                        sol\_a\_i: \ 21.0 \ sol\_g\_i: \ 0.0 \ d\_i: \ 29.0 \ sol\_taoi: \ 21.0 \ sol\_deltai: \ 29.0 \ sol\_deltai: \ 8.0
38
          i: 7.0 1 i: 5.0 p i: 29.0 aI i: 21.0
      : 21.0 sol_deltaP: 24.0 sol_deltaP - sol_taoP: 3.0 eLi: 2109152.0 sol_c_i: 2109152.0 sol_gp_i: 0.0 total work: 2240974.0 wasted work: 0.5
39
          i: 8.0 l_i: 4.0 p_i: 0.0 al_i: 62.0 sol_a_i: 62.0 sol_g_i: 0.0 d_i: 67.0 sol_taoi: 62.0 sol_deltai: 66.0 sol_deltai - sol_taoi: 4.0 sol_taoP:
     62.0 sol_deltaP: 64.0 sol_deltaP - sol_taoP: 2.0 cl_i: 1054576.0 sol_c_i: 1054576.0 sol_gp_i: 0.0 total work: 1054576.0 wasted work: 0.0
                                                                sol_a_i: 7.0 sol_g_i: 0.0 d_i: 14.0 sol_taoi: 7.0 sol_deltai: 12.0 sol_deltai - sol_taoi: 5.0 sol_taoP: 7.0
40
          i: 9.0 1_i: 5.0 p_i: 9.0 aI_i: 7.0
          sol deltaP: 8.0 sol deltaP - sol taoP: 1.0 cl i: 1318220.0 sol c i: 1318220.0 sol gp i: 0.0 total work: 1318220.0 wasted work: 0.0
          i: 10.0 l_i: 4.0 p_i: 25.0 al_i: 27.0 sol_a_i: 27.0 sol_g_i: 0.0 d_i: 38.0 sol_taoi: 27.0 sol_deltai: 36.0 sol_deltai - sol_taoi: 9.0
41
      sol_taoP: 27.0 sol_deltaP: 29.0 sol_deltaP - sol_taoP: 2.0 cl_i: 2372796.0 sol_c_i: 2372796.0 sol_gp_i: 0.0 total work: 2636440.0 wasted work
                                                                           sol_a_i: 3.0 sol_g_i: 0.0 d_i: 9.0 sol_taoi: 3.0 sol_deltai: 7.0 sol_deltai - sol_taoi: 4.0
42
          sol_deltaP: 5.0 sol_deltaP - sol_taoP: 2.0 cl_i: 1054576.0 sol_c_i: 1054576.0 sol_gp_i: 0.0 total work: 1054576.0 wasted work: 0.0
43
         sol_a_i: 28.0 sol_g_i: 0.0 d_i: 34.0 sol_taoi: 29.0 sol_deltai: 34.0 sol_deltai - sol_taoi: 5.0
     : 29.0 sol_deltaP: 31.0 sol_deltaP - sol_taoP: 2.0 cI_i: 1318220.0 sol_c_i: 1318220.0 sol_gp_i: 0.0 total work: 1581864.0 wasted work: 1.0 i: 13.0 l_i: 6.0 p_i: 18.0 aI_i: 31.0 sol_a_i: 31.0 sol_g_i: 0.0 d_i: 38.0 sol_taoi: 31.0 sol_deltai: 37.0 sol_deltai: 37.0 sol_deltai: 6.0
44
      sol_taoP: 31.0 sol_deltaP: 32.0 sol_deltaP - sol_taoP: 1.0 cI_i: 1581864.0
                                                                                                                           sol_c_i: 1581864.0 sol_gp_i: 0.0 total work: 1713686.0 wasted work
         i: 14.0 1 i: 4.0 p i: 14.0 aI i: 10.0
                                                                           sol a i: 10.0 sol g i: 0.0 d i: 18.0 sol taoi: 10.0 sol deltai: 16.0 sol deltai - sol taoi: 6.0
      sol_taoP: 10.0 sol_deltaP: 12.0 sol_deltaP - sol_taoP: 2.0 cl_i: 1581864.0 sol_c_i: 1581864.0 sol_gp_i: 0.0 total work: 1845508.0 wasted work
                                                                        sol_a_i: 39.0 sol_g_i: 0.0 d_i: 45.0 sol_taoi: 39.0 sol_deltai: 47.0 sol_deltai - sol_taoi: 8.0
46
          : 39.0 sol_deltaP: 42.0 sol_deltaP - sol_taoP: 3.0 cl_i: 2109152.0 sol_c_i: 2109152.0 sol_gp_i: 0.0 total work: 2109152.0 wasted work: 0.0
                                                                           sol_a_i: 8.0 sol_g_i: 0.0 d_i: 14.0 sol_taoi: 8.0 sol_deltai: 12.0 sol_deltai - sol_taoi: 4.0 sol_taoP
47
         i: 16.0 l_i: 4.0 p_i: 30.0 al_i: 8.0
      : 8.0 sol_deltaP: 9.0 sol_deltaP - sol_taoP: 1.0 cl_i: 1054576.0 sol_c_i: 1054576.0 sol_gp_i: 0.0 total work: 1318220.0 wasted work: 1.0
         i: 17.0 l_i: 5.0 p_i: 0.0 al_i: 52.0 sol_a_i: 52.0 sol_g_i: 0.0 d_i: 61.0 sol_taoi: 52.0 sol_deltai: 61.0 sol_deltai: 61.0 sol_deltai: 9.0 sol_taoi
        52.0 sol_deltaP: 55.0 sol_deltaP - sol_taoP: 3.0 cl_i: 2372796.0 sol_c_i: 2372796.0 sol_gp_i: 0.0 total work: 2372796.0 wasted work: 0.0
          i: 18.0 1 i: 6.0 p i: 18.0 aI i: 21.0
                                                                           sol_a_i: 21.0 sol_g_i: 0.0 d_i: 28.0 sol_taoi: 21.0 sol_deltai: 30.0 sol_deltai - sol_taoi: 9.0
      sol_taoP: 21.0 sol_deltaP: 23.0 sol_deltaP - sol_taoP: 2.0 cl_1: 2372796.0 sol_c_i: 2372796.0 sol_gp_i: 0.0 total work: 2504618.0 wasted work
      : 0.5
                                                                            sol\_a\_i: \ 2.0 \quad sol\_g\_i: \ 0.0 \quad d\_i: \ 12.0 \quad sol\_taoi: \ 2.0 \quad sol\_deltai: \ 11.0 \quad sol\_deltai - sol\_taoi: \ 9.0 \quad sol\_taoP
         : 2.0 sol_deltaP: 5.0 sol_deltaP - sol_taoP: 3.0 cl_i: 2372796.0 sol_c_i: 2372796.0 sol_gp_i: 0.0 total work: 2372796.0 wasted work: 0.0
         i: 20.0 1_i: 4.0 p_i: 18.0 aI_i: 2.0
                                                                           sol_a_i: 2.0 sol_g_i: 0.0 d_i: 9.0 sol_taoi: 2.0 sol_deltai: 9.0 sol_deltai - sol_taoi: 7.0
                                                                                                                                                                                                                     sol_taoP: 2
             sol_deltaP: 4.0 sol_deltaP - sol_taoP: 2.0 cl_i: 1845508.0 sol_c_i: 1845508.0 sol_gp_i: 0.0 total work: 1845508.0 wasted work: 0.0
         i: 21.0 l_i: 4.0 p_i: 12.0 al_i: 40.0
                                                                           sol_a_i: 40.0 sol_g_i: 0.0 d_i: 56.0 sol_taoi: 40.0 sol_deltai: 48.0 sol_deltai - sol_taoi: 8.0
52
                              sol deltaP: 42.0
                                                         sol_deltaP - sol_taoP: 2.0 cI_i: 2109152.0
                                                                                                                            sol_c_i: 2109152.0 sol_gp_i: 0.0 total work: 2240974.0 wasted work
      sol taoP: 40.0
```

```
unknown
 52 : 0.5
      sol a i: 24.0 sol g i: 0.0 d i: 35.0 sol taoi: 24.0 sol deltai: 28.0 sol deltai - sol taoi: 4.0
     sol_taoP: 24.0 sol_deltaP: 25.0 sol_deltaP - sol_taoP: 1.0 cl_i: 1054576.0 sol_c_i: 1054576.0 sol_gp_i: 0.0 total work: 1054576.0 wasted work
       i: 23.0 1 i: 5.0 p i: 18.0 aI i: 14.0
                                               sol a i: 14.0 sol g i: 0.0 d i: 31.0 sol taoi: 14.0 sol deltai: 19.0 sol deltai - sol taoi: 5.0
     sol taoP: 14.0 sol deltaP: 15.0 sol deltaP - sol taoP: 1.0 cl_i: 1318220.0 sol_c_i: 1318220.0 sol_gp_i: 0.0 total work: 1581864.0 wasted work
      i: 24.0 1_i: 6.0 p_i: 8.0 aI_i: 11.0
                                             sol_a_i: 14.2 sol_g_i: 0.4 d_i: 29.0 sol_taoi: 15.0 sol_deltai: 21.0 sol_deltai - sol_taoi: 6.0
     sol taoP: 15.0 sol deltaP: 17.0 sol deltaP - sol taoP: 2.0 cl i: 1581864.0 sol c i: 3427372.0 sol gp i: 1.0 total work: 3427372.0 wasted work
     0.0
       i: 25.0 1_i: 6.0 p_i: 0.0 aI_i: 28.0
                                             sol_a_i: 38.0 sol_g_i: 1.0 d_i: 62.0 sol_taoi: 38.0
                                                                                                   sol_deltai: 44.0 sol_deltai - sol_taoi: 6.0
     sol taoP: 38.0 sol deltaP: 40.0 sol deltaP - sol taoP: 2.0 cI i: 1581864.0 sol c i: 1898236.8
                                                                                                   sol_gp_i: 0.6 total work: 2109152.0 wasted work
     : 0.799999999999998
       i: 26.0 l_i: 4.0 p_i: 5.0 al_i: 51.0 sol_a_i: 58.0 sol_g_i: 1.0 d_i: 80.0 sol_taoi: 58.0 sol_deltai: 67.0 sol_deltai: 67.0 sol_deltai: 9.0
     sol_taoP: 58.0 sol_deltaP: 61.0 sol_deltaP - sol_taoP: 3.0 cl_i: 2372796.0 sol_c_i: 2372796.0 sol_gp_i: 0.0 total work: 2372796.0 wasted work
       i: 27.0 1_i: 5.0 p_i: 29.0 aI_i: 27.0
                                               sol_a_i: 31.2 sol_g_i: 0.6 d_i: 46.0 sol_taoi: 32.0 sol_deltai: 37.0 sol_deltai - sol_taoi: 5.0
     sol_taoP: 32.0 sol_deltaP: 35.0 sol_deltaP - sol_taoP: 3.0 cl_i: 1318220.0 sol_c_i: 3427372.0 sol_gp_i: 1.0 total work: 3954660.0 wasted work
                                                sol_a_i: 24.6 sol_g_i: 0.6 d_i: 45.0 sol_taoi: 25.0 sol_deltai: 31.0 sol_deltai - sol_taoi: 6.0
       i: 28.0 1 i: 6.0 p i: 12.0 aI i: 21.0
     sol_taoP: 25.0 sol_deltaP: 27.0 sol_deltaP - sol_taoP: 2.0 cl_i: 1581864.0 sol_c_i: 2109152.0 sol_gp_i: 0.4 total work: 2240974.0 wasted work
       i: 29.0 1_i: 4.0 p_i: 13.0 aI_i: 29.0 sol_a_i: 32.6 sol_g_i: 0.4 d_i: 55.0 sol_taoi: 33.0 sol_deltai: 38.0 sol_deltai - sol_taoi: 5.0
     sol_taoP: 33.0 sol_deltaP: 37.0 sol_deltaP - sol_taoP: 4.0 cl_i: 1318220.0 sol_c_i: 3427372.0 sol_gp_i: 1.0 total work: 3427372.0 wasted work
 61
 62 Optimal objective = 1628.0
 63
 64 Time: 835.000000
 65
 66
 67
 68
```