```
 [17 18]
 [20 22]
 [23 24]
 [26 27]
 [28 31]
 [32 35]
 [36 37]
 [38 39]
 [40 43]
 [44 45]
 [46 49]
 [51 52]
 [54 55]
 [57 59]
 [61 62]
 [63 65]
 [66 67]
 [68 69]
 [71 72]
 [74 75]
 [76 77]
 [81 82]
 [83 84]
 [89 90]
 [91 93]]
____________________
MinSum with DP result:
Tour 1 start: -4.0
Tour 1 end: 24.0
Tour 1 length: 429.4748489930265
Tour 2 start: 26.0
Tour 2 end: 67.0
Tour 2 length: 453.6070764406637
Tour 3 start: 68.0
Tour 3 end: 93.0
Tour 3 length: 456.8091179333858
Total number of tours: 3
Total length: 1339.891043367076
____________________
 Greedy results:
T1 = [[68. 93.]]
T1 total length: l1 = 456.8091179333858
T2 = [[26. 67.]
 [-4. 24.]]
T2 total length: l2 = 883.0819254336902
____________________
Cutting and enlarging results:
T1 = [[68. 93.]
 [-4.  9.]]
T1 total length: l1 = 870.0515115222265
T2 = [[26. 67.]
 [ 9. 24.]]
T2 total length: l2 = 870.2443270209313
____________________
MILP solver results:
C:\Users\Alina\.conda\envs\MILP\lib\site-packages\pulp\pulp.py:1316: UserWarning: Spaces
are not permitted in the name. Converted to '_'
  warnings.warn("Spaces are not permitted in the name. Converted to '_'")
Success: optimal answer found
T1 = [[-4. 12.]
```

```
 [26. 67.]]
T1 total length: l1 = 870.0067490233546
T2 = [[13. 24.]
 [68. 93.]]
T2 total length: l2 = 869.6660256002416
Experiment N: 8
____________________
Number of points on the line (discretization): 100
Base coordinates: [  9 200]
Max Lenght: 480
We have to cover the following segments:
 [[-8 -6]
 [-4 -2]
 [-1  0]
 [ 1  3]
 [ 6  8]
 [ 9 12]
 [13 15]
 [16 17]
 [19 21]
 [22 25]
 [27 28]
 [32 34]
 [40 43]
 [45 49]
 [50 51]
 [54 56]
 [59 62]
 [65 70]
 [74 75]
 [76 77]
 [78 80]
 [81 83]
 [88 89]]
____________________
MinSum with DP result:
Tour 1 start: -8.0
Tour 1 end: 28.0
Tour 1 length: 438.11042503297824
Tour 2 start: 32.0
Tour 2 end: 89.0
Tour 2 length: 478.45247916855067
Total number of tours: 2
Total length: 916.5629042015289
____________________
 Greedy results:
T1 = [[-8. 28.]]
T1 total length: l1 = 438.11042503297824
T2 = [[32. 89.]]
T2 total length: l2 = 478.45247916855067
____________________
Cutting and enlarging results:
T1 = [[-8. 28.]]
T1 total length: l1 = 438.11042503297824
T2 = [[32. 89.]]
T2 total length: l2 = 478.45247916855067
____________________
MILP solver results:
C:\Users\Alina\.conda\envs\MILP\lib\site-packages\pulp\pulp.py:1316: UserWarning: Spaces
are not permitted in the name. Converted to '_'
```

```
  warnings.warn("Spaces are not permitted in the name. Converted to '_'")
Success: optimal answer found
T1 = [[50. 89.]]
T1 total length: l1 = 464.063938030679
T2 = [[-8. 49.]]
T2 total length: l2 = 463.07496707122766
Experiment N: 9
____________________
Number of points on the line (discretization): 100
Base coordinates: [ 37 200]
Max Lenght: 446
We have to cover the following segments:
 [[-35 -34]
 [-30 -23]
 [-13  -7]
 [ 12  13]
 [ 39  41]
 [ 42  46]
 [ 51  60]]
____________________
MinSum with DP result:
Tour 1 start: -35.0
Tour 1 end: -7.0
Tour 1 length: 431.16186754980527
Tour 2 start: 12.0
Tour 2 end: 13.0
Tour 2 length: 401.7817312565202
Tour 3 start: 39.0
Tour 3 end: 60.0
Tour 3 length: 433.5731540068963
Total number of tours: 3
Total length: 1266.5167528132217
____________________
 Greedy results:
T1 = [[39. 60.]]
T1 total length: l1 = 433.5731540068963
T2 = [[-35.  -7.]
 [ 12.  13.]]
T2 total length: l2 = 832.9435988063254
____________________
Cutting and enlarging results:
T1 = [[39. 60.]]
T1 total length: l1 = 433.5731540068963
T2 = [[-35.  -7.]
 [ 12.  13.]]
T2 total length: l2 = 832.9435988063254
____________________
MILP solver results:
C:\Users\Alina\.conda\envs\MILP\lib\site-packages\pulp\pulp.py:1316: UserWarning: Spaces
are not permitted in the name. Converted to '_'
  warnings.warn("Spaces are not permitted in the name. Converted to '_'")
Success: optimal answer found
T1 = [[39. 60.]]
T1 total length: l1 = 433.5731540068963
T2 = [[-35.  -7.]
 [ 12.  13.]]
T2 total length: l2 = 832.9435988063254
Experiment N: 10
____________________
Number of points on the line (discretization): 100
```

```
Base coordinates: [ 45 200]
Max Lenght: 506
We have to cover the following segments:
 [[-45 -44]
 [-43 -42]
 [-41 -39]
 [-38 -37]
 [-36 -35]
 [-34 -33]
 [-32 -31]
 [-30 -29]
 [-28 -27]
 [-26 -25]
 [-24 -21]
 [-20 -19]
 [-18 -17]
 [-16 -15]
 [-14 -13]
 [-12 -11]
 [ -9  -8]
 [ -7  -6]
 [ -5  -4]
 [ -3  -2]
 [ -1   0]
 [  1   2]
 [  3   4]
 [  5   6]
 [  7   8]
 [  9  10]
 [ 11  12]
 [ 13  14]
 [ 15  16]
 [ 17  18]
 [ 20  21]
 [ 22  23]
 [ 24  25]
 [ 26  27]
 [ 28  29]
 [ 30  31]
 [ 32  33]
 [ 34  35]
 [ 36  37]
 [ 38  39]
 [ 40  41]
 [ 42  43]
 [ 44  45]
 [ 46  47]
 [ 48  49]
 [ 50  51]
 [ 52  53]]
____________________
MinSum with DP result:
Tour 1 start: -45.0
Tour 1 end: -11.0
Tour 1 length: 439.30227157973025
Tour 2 start: -9.0
Tour 2 end: 53.0
Tour 2 length: 469.1057566714545
Total number of tours: 2
Total length: 908.4080282511848
```

```
____________________
 Greedy results:
T1 = [[-45. -11.]]
T1 total length: l1 = 439.30227157973025
T2 = [[-9. 53.]]
T2 total length: l2 = 469.1057566714545
____________________
Cutting and enlarging results:
T1 = [[-45. -11.]]
T1 total length: l1 = 439.30227157973025
T2 = [[-9. 53.]]
T2 total length: l2 = 469.1057566714545
____________________
MILP solver results:
C:\Users\Alina\.conda\envs\MILP\lib\site-packages\pulp\pulp.py:1316: UserWarning: Spaces
are not permitted in the name. Converted to '_'
  warnings.warn("Spaces are not permitted in the name. Converted to '_'")
Success: optimal answer found
T1 = [[-45.   4.]]
T1 total length: l1 = 454.03999600079976
T2 = [[ 5. 53.]]
T2 total length: l2 = 454.9658493208392
Experiment N: 11
____________________
Number of points on the line (discretization): 100
Base coordinates: [ 34 200]
Max Lenght: 453
We have to cover the following segments:
 [[-34 -32]
 [-29 -28]
 [-27 -26]
 [-25 -23]
 [-22 -21]
 [-18 -17]
 [-16 -15]
 [-14 -13]
 [-12 -11]
 [-10  -7]
 [ -6  -5]
 [ -4   0]
 [  1   3]
 [  4   5]
 [  6   7]
 [  8   9]
 [ 10  12]
 [ 13  14]
 [ 15  16]
 [ 18  19]
 [ 20  21]
 [ 24  25]
 [ 26  27]
 [ 28  29]
 [ 30  31]
 [ 32  33]
 [ 34  35]
 [ 36  37]
 [ 38  39]
 [ 41  42]
 [ 43  44]
 [ 45  46]
```

```
 [ 48  50]
 [ 51  52]
 [ 53  55]
 [ 56  58]
 [ 59  60]
 [ 61  62]
 [ 63  64]]
____________________
MinSum with DP result:
Tour 1 start: -34.0
Tour 1 end: -21.0
Tour 1 length: 416.96889399874283
Tour 2 start: -18.0
Tour 2 end: 21.0
Tour 2 length: 440.9078442305996
Tour 3 start: 24.0
Tour 3 end: 64.0
Tour 3 length: 451.4253289667338
Total number of tours: 3
Total length: 1309.3020671960762
____________________
 Greedy results:
T1 = [[24. 64.]]
T1 total length: l1 = 451.4253289667338
T2 = [[-34. -21.]
 [-18.  21.]]
T2 total length: l2 = 857.8767382293424
____________________
Cutting and enlarging results:
T1 = [[ 24.  64.]
 [-18. -16.]]
T1 total length: l1 = 854.8726745900568
T2 = [[-34. -21.]
 [-16.  21.]]
T2 total length: l2 = 855.7073511335219
____________________
MILP solver results:
C:\Users\Alina\.conda\envs\MILP\lib\site-packages\pulp\pulp.py:1316: UserWarning: Spaces
are not permitted in the name. Converted to '_'
  warnings.warn("Spaces are not permitted in the name. Converted to '_'")
Success: optimal answer found
T1 = [[ 4.  7.]
 [24. 64.]]
T1 total length: l1 = 854.5877874748693
T2 = [[-34.   3.]
 [  8.  21.]]
T2 total length: l2 = 854.1513287844091
Experiment N: 12
____________________
Number of points on the line (discretization): 100
Base coordinates: [ 65 200]
Max Lenght: 504
We have to cover the following segments:
 [[-65 -64]
 [-62 -61]
 [-60 -58]
 [-57 -55]
 [-54 -52]
 [-50 -48]
 [-47 -46]
```

```
 [-45 -44]
 [-43 -41]
 [-40 -36]
 [-35 -34]
 [-33 -31]
 [-30 -28]
 [-27 -24]
 [-23 -22]
 [-20 -18]
 [-17 -16]
 [-15 -13]
 [-10  -9]
 [ -7  -6]
 [ -5  -4]
 [ -3  -2]
 [  1   2]
 [  3   5]
 [  7   8]
 [  9  11]
 [ 12  13]
 [ 14  15]
 [ 18  20]
 [ 21  23]
 [ 27  28]
 [ 29  30]
 [ 32  33]]
____________________
MinSum with DP result:
Tour 1 start: -65.0
Tour 1 end: -2.0
Tour 1 length: 473.30740819814343
Tour 2 start: 1.0
Tour 2 end: 33.0
Tour 2 length: 434.70671799672937
Total number of tours: 2
Total length: 908.0141261948728
____________________
 Greedy results:
T1 = [[ 1. 33.]]
T1 total length: l1 = 434.70671799672937
T2 = [[-65.  -2.]]
T2 total length: l2 = 473.30740819814343
____________________
Cutting and enlarging results:
T1 = [[ 1. 33.]]
T1 total length: l1 = 434.70671799672937
T2 = [[-65.  -2.]]
T2 total length: l2 = 473.30740819814343
____________________
MILP solver results:
C:\Users\Alina\.conda\envs\MILP\lib\site-packages\pulp\pulp.py:1316: UserWarning: Spaces
are not permitted in the name. Converted to '_'
  warnings.warn("Spaces are not permitted in the name. Converted to '_'")
Success: optimal answer found
T1 = [[-65. -22.]]
T1 total length: l1 = 454.50377017658127
T2 = [[-20.  33.]]
T2 total length: l2 = 456.70173043477195
Experiment N: 13
____________________
```

```
Number of points on the line (discretization): 100
Base coordinates: [ 66 200]
Max Lenght: 502
We have to cover the following segments:
 [[-57 -44]]
TODO:One side case
Experiment N: 14
____________________
Number of points on the line (discretization): 100
Base coordinates: [ 94 200]
Max Lenght: 465
We have to cover the following segments:
 [[-94 -93]
 [-92 -90]
 [-88 -87]
 [-86 -85]
 [-84 -83]
 [-81 -80]
 [-79 -78]
 [-77 -76]
 [-75 -73]
 [-72 -71]
 [-69 -68]
 [-67 -66]
 [-65 -64]
 [-63 -62]
 [-61 -60]
 [-59 -58]
 [-57 -56]
 [-55 -54]
 [-53 -52]
 [-51 -50]
 [-49 -48]
 [-46 -45]
 [-44 -43]
 [-42 -41]
 [-40 -39]
 [-38 -37]
 [-34 -33]
 [-32 -29]
 [-28 -27]
 [-26 -25]
 [-24 -23]
 [-21 -20]
 [-19 -18]
 [-17 -14]
 [-13 -12]
 [-11 -10]
 [ -9  -8]
 [ -7  -2]
 [ -1   0]
 [  1   2]
 [  3   4]]
____________________
MinSum with DP result:
Tour 1 start: -94.0
Tour 1 end: -60.0
Tour 1 length: 463.7948176714852
Tour 2 start: -59.0
Tour 2 end: -8.0
```

```
Tour 2 length: 459.68091820882046
Tour 3 start: -7.0
Tour 3 end: 4.0
Tour 3 length: 411.1624585081355
Total number of tours: 3
Total length: 1334.6381943884412
____________________
 Greedy results:
T1 = [[-94. -60.]]
T1 total length: l1 = 463.7948176714852
T2 = [[-59.  -8.]
 [ -7.   4.]]
T2 total length: l2 = 870.843376716956
____________________
Cutting and enlarging results:
T1 = [[-94. -60.]
 [  1.   4.]]
T1 total length: l1 = 866.8373136566602
T2 = [[-59.  -8.]
 [ -7.   1.]]
T2 total length: l2 = 867.8058807005314
____________________
MILP solver results:
C:\Users\Alina\.conda\envs\MILP\lib\site-packages\pulp\pulp.py:1316: UserWarning: Spaces
are not permitted in the name. Converted to '_'
  warnings.warn("Spaces are not permitted in the name. Converted to '_'")
```