

```

2 ===== Iteration 1 =====
3 Ant 1: 1 -> 2 -> 11 -> 4 -> 10 -> 12 -> 17 -> 8 -> 18
-> 13 -> 14 -> 6 -> 5 -> 16 -> 3 -> 15 -> 19 -> 7
-> 9 -> 1 | Length = 6886,86
4 Ant 2: 2 -> 3 -> 11 -> 10 -> 4 -> 17 -> 19 -> 15 ->
12 -> 18 -> 7 -> 9 -> 5 -> 13 -> 8 -> 14 -> 16 -> 6
-> 1 -> 2 | Length = 5650,62
5 Ant 3: 3 -> 16 -> 2 -> 10 -> 5 -> 4 -> 15 -> 19 -> 6
-> 7 -> 9 -> 12 -> 8 -> 1 -> 14 -> 18 -> 13 -> 11
-> 17 -> 3 | Length = 6699,83
6 Ant 4: 4 -> 3 -> 18 -> 17 -> 2 -> 10 -> 12 -> 5 -> 8
-> 19 -> 16 -> 9 -> 11 -> 13 -> 14 -> 1 -> 15 -> 7
-> 6 -> 4 | Length = 6854,33
7 Ant 5: 5 -> 4 -> 16 -> 10 -> 12 -> 14 -> 15 -> 9 ->
17 -> 2 -> 18 -> 19 -> 8 -> 1 -> 3 -> 11 -> 7 -> 13
-> 6 -> 5 | Length = 6655,57
8 Ant 6: 6 -> 9 -> 13 -> 14 -> 3 -> 18 -> 16 -> 5 -> 10
-> 7 -> 4 -> 1 -> 12 -> 17 -> 19 -> 2 -> 11 -> 15
-> 8 -> 6 | Length = 6648,25
9 Ant 7: 7 -> 11 -> 17 -> 15 -> 1 -> 10 -> 19 -> 6 -> 4
-> 8 -> 16 -> 14 -> 5 -> 3 -> 12 -> 13 -> 18 -> 9
-> 2 -> 7 | Length = 7064,54
10 Ant 8: 8 -> 17 -> 12 -> 4 -> 3 -> 5 -> 7 -> 1 -> 18
-> 13 -> 10 -> 6 -> 16 -> 2 -> 11 -> 14 -> 19 -> 9
-> 15 -> 8 | Length = 6715,57
11 Ant 9: 9 -> 4 -> 11 -> 12 -> 13 -> 5 -> 7 -> 15 -> 18
-> 6 -> 1 -> 3 -> 17 -> 16 -> 14 -> 10 -> 19 -> 2
-> 8 -> 9 | Length = 6721,85
12 Ant 10: 10 -> 4 -> 18 -> 12 -> 16 -> 9 -> 5 -> 13 ->
3 -> 6 -> 17 -> 8 -> 11 -> 2 -> 15 -> 7 -> 1 -> 14
-> 19 -> 10 | Length = 6242,53
13 Ant 11: 11 -> 17 -> 19 -> 2 -> 14 -> 18 -> 8 -> 10
-> 12 -> 1 -> 3 -> 13 -> 5 -> 7 -> 15 -> 9 -> 4 -> 6
-> 16 -> 11 | Length = 5533,58
14 Ant 12: 12 -> 18 -> 7 -> 3 -> 15 -> 9 -> 4 -> 11 -> 1
-> 10 -> 5 -> 2 -> 8 -> 16 -> 6 -> 17 -> 13 -> 19
-> 14 -> 12 | Length = 6444,14
15 Ant 13: 13 -> 14 -> 9 -> 8 -> 16 -> 11 -> 2 -> 3 -> 6
-> 1 -> 12 -> 19 -> 10 -> 18 -> 15 -> 7 -> 17 -> 4
-> 5 -> 13 | Length = 6451,19
16 Ant 14: 14 -> 3 -> 9 -> 10 -> 18 -> 12 -> 11 -> 17

```

```

16  -> 6 -> 4 -> 1 -> 7 -> 16 -> 15 -> 13 -> 2 -> 8 ->
    19 -> 5 -> 14 | Length = 6996,94
17 Ant 15: 15 -> 4 -> 9 -> 1 -> 7 -> 10 -> 13 -> 17 ->
    11 -> 14 -> 5 -> 19 -> 18 -> 8 -> 16 -> 6 -> 12 -> 2
    -> 3 -> 15 | Length = 6795,64
18 Ant 16: 16 -> 12 -> 10 -> 14 -> 13 -> 18 -> 6 -> 8
    -> 19 -> 11 -> 3 -> 17 -> 7 -> 1 -> 9 -> 2 -> 4 -> 5
    -> 15 -> 16 | Length = 6767,11
19 Ant 17: 17 -> 19 -> 11 -> 6 -> 14 -> 4 -> 5 -> 7 ->
    13 -> 15 -> 16 -> 18 -> 8 -> 1 -> 9 -> 2 -> 3 -> 10
    -> 12 -> 17 | Length = 6723,92
20 Ant 18: 18 -> 16 -> 12 -> 14 -> 11 -> 15 -> 2 -> 7
    -> 8 -> 5 -> 3 -> 13 -> 6 -> 19 -> 4 -> 17 -> 10 ->
    9 -> 1 -> 18 | Length = 7005,35
21 Ant 19: 19 -> 12 -> 8 -> 15 -> 7 -> 4 -> 6 -> 18 -> 3
    -> 10 -> 1 -> 13 -> 11 -> 2 -> 9 -> 16 -> 5 -> 14
    -> 17 -> 19 | Length = 7093,61
22 Best so far: 5533,58
23
24 ===== Iteration 2 =====
25 Ant 1: 1 -> 9 -> 8 -> 14 -> 3 -> 17 -> 12 -> 5 -> 2
    -> 13 -> 4 -> 11 -> 7 -> 18 -> 10 -> 16 -> 6 -> 19
    -> 15 -> 1 | Length = 7184,29
26 Ant 2: 2 -> 3 -> 19 -> 11 -> 17 -> 14 -> 1 -> 12 -> 5
    -> 10 -> 7 -> 4 -> 9 -> 15 -> 6 -> 18 -> 16 -> 8 ->
    13 -> 2 | Length = 6335,58
27 Ant 3: 3 -> 4 -> 5 -> 6 -> 15 -> 7 -> 14 -> 11 -> 17
    -> 19 -> 18 -> 13 -> 9 -> 2 -> 16 -> 8 -> 12 -> 10
    -> 1 -> 3 | Length = 6682,43
28 Ant 4: 4 -> 17 -> 9 -> 1 -> 2 -> 10 -> 7 -> 13 -> 14
    -> 11 -> 18 -> 6 -> 16 -> 5 -> 15 -> 8 -> 3 -> 19
    -> 12 -> 4 | Length = 7046,06
29 Ant 5: 5 -> 9 -> 1 -> 4 -> 17 -> 12 -> 10 -> 14 -> 15
    -> 13 -> 8 -> 16 -> 6 -> 7 -> 18 -> 3 -> 19 -> 2 ->
    11 -> 5 | Length = 6370,71
30 Ant 6: 6 -> 19 -> 17 -> 11 -> 9 -> 4 -> 5 -> 10 -> 2
    -> 15 -> 7 -> 3 -> 8 -> 12 -> 16 -> 1 -> 14 -> 13
    -> 18 -> 6 | Length = 6805,95
31 Ant 7: 7 -> 1 -> 12 -> 10 -> 3 -> 15 -> 19 -> 6 -> 2
    -> 11 -> 17 -> 18 -> 13 -> 5 -> 14 -> 9 -> 16 -> 4
    -> 8 -> 7 | Length = 6858,85

```

```

32 Ant 8: 8 -> 7 -> 15 -> 19 -> 14 -> 1 -> 5 -> 18 -> 2
    -> 16 -> 9 -> 10 -> 6 -> 11 -> 13 -> 3 -> 12 -> 17
    -> 4 -> 8 | Length = 6982,42
33 Ant 9: 9 -> 16 -> 19 -> 13 -> 18 -> 3 -> 17 -> 7 -> 8
    -> 10 -> 1 -> 14 -> 11 -> 12 -> 15 -> 2 -> 4 -> 6
    -> 5 -> 9 | Length = 6958,18
34 Ant 10: 10 -> 1 -> 3 -> 2 -> 7 -> 18 -> 14 -> 12 ->
    13 -> 11 -> 4 -> 15 -> 9 -> 5 -> 6 -> 17 -> 19 -> 16
    -> 8 -> 10 | Length = 5728,43
35 Ant 11: 11 -> 2 -> 19 -> 13 -> 14 -> 18 -> 17 -> 12
    -> 1 -> 6 -> 4 -> 5 -> 16 -> 10 -> 9 -> 8 -> 15 -> 7
    -> 3 -> 11 | Length = 6156,52
36 Ant 12: 12 -> 2 -> 14 -> 19 -> 8 -> 6 -> 1 -> 5 -> 16
    -> 13 -> 9 -> 3 -> 17 -> 4 -> 10 -> 15 -> 7 -> 18
    -> 11 -> 12 | Length = 6399,20
37 Ant 13: 13 -> 14 -> 19 -> 6 -> 17 -> 3 -> 7 -> 1 ->
    10 -> 12 -> 9 -> 11 -> 15 -> 16 -> 8 -> 5 -> 4 -> 2
    -> 18 -> 13 | Length = 6642,83
38 Ant 14: 14 -> 17 -> 4 -> 5 -> 3 -> 7 -> 15 -> 1 -> 6
    -> 18 -> 12 -> 16 -> 8 -> 13 -> 9 -> 19 -> 11 -> 10
    -> 2 -> 14 | Length = 5859,49
39 Ant 15: 15 -> 19 -> 14 -> 7 -> 13 -> 9 -> 4 -> 1 -> 3
    -> 11 -> 2 -> 16 -> 17 -> 12 -> 10 -> 8 -> 6 -> 18
    -> 5 -> 15 | Length = 6337,38
40 Ant 16: 16 -> 5 -> 13 -> 10 -> 3 -> 12 -> 17 -> 4 ->
    19 -> 8 -> 6 -> 2 -> 1 -> 18 -> 7 -> 11 -> 9 -> 14
    -> 15 -> 16 | Length = 6069,49
41 Ant 17: 17 -> 8 -> 6 -> 9 -> 12 -> 16 -> 2 -> 15 -> 7
    -> 11 -> 13 -> 5 -> 4 -> 10 -> 14 -> 1 -> 3 -> 19
    -> 18 -> 17 | Length = 6893,70
42 Ant 18: 18 -> 19 -> 2 -> 3 -> 5 -> 7 -> 1 -> 6 -> 14
    -> 11 -> 9 -> 13 -> 15 -> 12 -> 4 -> 8 -> 10 -> 16
    -> 17 -> 18 | Length = 6144,64
43 Ant 19: 19 -> 17 -> 3 -> 15 -> 14 -> 1 -> 9 -> 16 ->
    6 -> 18 -> 2 -> 4 -> 7 -> 11 -> 12 -> 13 -> 8 -> 5
    -> 10 -> 19 | Length = 6189,10
44 Best so far: 5533,58
45
46 ===== Iteration 3 =====
47 Ant 1: 1 -> 14 -> 19 -> 3 -> 7 -> 10 -> 4 -> 17 -> 15
    -> 11 -> 18 -> 13 -> 9 -> 12 -> 5 -> 2 -> 8 -> 16

```

```

47 -> 6 -> 1 | Length = 6789,55
48 Ant 2: 2 -> 3 -> 15 -> 6 -> 1 -> 13 -> 17 -> 9 -> 11
    -> 19 -> 8 -> 4 -> 12 -> 10 -> 16 -> 5 -> 7 -> 18
    -> 14 -> 2 | Length = 6350,79
49 Ant 3: 3 -> 11 -> 17 -> 6 -> 2 -> 7 -> 8 -> 10 -> 16
    -> 15 -> 9 -> 19 -> 12 -> 4 -> 5 -> 14 -> 13 -> 18
    -> 1 -> 3 | Length = 6081,63
50 Ant 4: 4 -> 18 -> 13 -> 2 -> 17 -> 10 -> 8 -> 6 -> 7
    -> 11 -> 12 -> 15 -> 5 -> 3 -> 19 -> 14 -> 9 -> 1
    -> 16 -> 4 | Length = 6839,66
51 Ant 5: 5 -> 16 -> 8 -> 15 -> 4 -> 13 -> 18 -> 7 -> 12
    -> 11 -> 2 -> 19 -> 3 -> 6 -> 1 -> 14 -> 10 -> 9 ->
    17 -> 5 | Length = 6141,01
52 Ant 6: 6 -> 13 -> 1 -> 7 -> 15 -> 10 -> 12 -> 11 -> 2
    -> 3 -> 19 -> 18 -> 9 -> 14 -> 5 -> 8 -> 16 -> 17
    -> 4 -> 6 | Length = 7313,86
53 Ant 7: 7 -> 15 -> 1 -> 11 -> 3 -> 16 -> 2 -> 6 -> 10
    -> 19 -> 17 -> 18 -> 5 -> 12 -> 8 -> 13 -> 14 -> 9
    -> 4 -> 7 | Length = 6515,02
54 Ant 8: 8 -> 3 -> 4 -> 7 -> 14 -> 18 -> 17 -> 12 -> 9
    -> 13 -> 11 -> 2 -> 16 -> 15 -> 19 -> 10 -> 1 -> 6
    -> 5 -> 8 | Length = 5799,09
55 Ant 9: 9 -> 11 -> 19 -> 6 -> 1 -> 15 -> 5 -> 2 -> 4
    -> 17 -> 12 -> 8 -> 13 -> 18 -> 14 -> 3 -> 10 -> 16
    -> 7 -> 9 | Length = 6504,28
56 Ant 10: 10 -> 9 -> 2 -> 5 -> 14 -> 13 -> 18 -> 6 ->
    19 -> 4 -> 16 -> 11 -> 3 -> 7 -> 12 -> 17 -> 8 -> 1
    -> 15 -> 10 | Length = 7507,62
57 Ant 11: 11 -> 15 -> 19 -> 6 -> 17 -> 8 -> 4 -> 9 -> 1
    -> 12 -> 16 -> 14 -> 3 -> 13 -> 18 -> 2 -> 7 -> 10
    -> 5 -> 11 | Length = 6293,09
58 Ant 12: 12 -> 16 -> 9 -> 4 -> 17 -> 11 -> 13 -> 19
    -> 2 -> 10 -> 1 -> 5 -> 18 -> 8 -> 6 -> 14 -> 15 ->
    7 -> 3 -> 12 | Length = 6697,85
59 Ant 13: 13 -> 11 -> 4 -> 2 -> 10 -> 18 -> 3 -> 6 -> 9
    -> 1 -> 7 -> 17 -> 16 -> 19 -> 8 -> 14 -> 5 -> 15
    -> 12 -> 13 | Length = 7459,60
60 Ant 14: 14 -> 6 -> 5 -> 13 -> 3 -> 19 -> 4 -> 15 ->
    16 -> 9 -> 8 -> 10 -> 1 -> 7 -> 18 -> 2 -> 11 -> 17
    -> 12 -> 14 | Length = 5825,55
61 Ant 15: 15 -> 9 -> 10 -> 3 -> 18 -> 6 -> 17 -> 8 ->

```

```

61 14 -> 4 -> 1 -> 2 -> 19 -> 7 -> 5 -> 13 -> 11 -> 16
    -> 12 -> 15 | Length = 6257,79
62 Ant 16: 16 -> 17 -> 4 -> 7 -> 1 -> 8 -> 13 -> 3 ->
    12 -> 10 -> 15 -> 11 -> 14 -> 9 -> 2 -> 5 -> 18 -> 6
    -> 19 -> 16 | Length = 7051,70
63 Ant 17: 17 -> 12 -> 15 -> 6 -> 8 -> 13 -> 18 -> 2
    -> 9 -> 19 -> 4 -> 10 -> 1 -> 14 -> 11 -> 7 -> 16
    -> 5 -> 3 -> 17 | Length = 7074,42
64 Ant 18: 18 -> 8 -> 16 -> 12 -> 17 -> 11 -> 14 -> 13
    -> 19 -> 2 -> 5 -> 3 -> 4 -> 10 -> 6 -> 7 -> 15 ->
    1 -> 9 -> 18 | Length = 7335,38
65 Ant 19: 19 -> 15 -> 4 -> 18 -> 13 -> 6 -> 10 -> 9
    -> 11 -> 17 -> 3 -> 7 -> 5 -> 16 -> 12 -> 2 -> 1
    -> 14 -> 8 -> 19 | Length = 6526,05
66 Best so far: 5533,58
67
68 ===== Iteration 4 =====
69 Ant 1: 1 -> 11 -> 17 -> 12 -> 18 -> 7 -> 3 -> 10 ->
    8 -> 6 -> 19 -> 14 -> 5 -> 15 -> 2 -> 4 -> 9 -> 13
    -> 16 -> 1 | Length = 6433,49
70 Ant 2: 2 -> 15 -> 17 -> 14 -> 18 -> 1 -> 9 -> 4 -> 7
    -> 6 -> 10 -> 12 -> 19 -> 13 -> 3 -> 5 -> 16 -> 11
    -> 8 -> 2 | Length = 6876,71
71 Ant 3: 3 -> 9 -> 6 -> 8 -> 19 -> 15 -> 1 -> 10 -> 4
    -> 2 -> 14 -> 11 -> 7 -> 5 -> 18 -> 17 -> 12 -> 16
    -> 13 -> 3 | Length = 6955,33
72 Ant 4: 4 -> 8 -> 14 -> 5 -> 12 -> 10 -> 16 -> 17 ->
    18 -> 19 -> 2 -> 15 -> 11 -> 13 -> 9 -> 1 -> 6 -> 7
    -> 3 -> 4 | Length = 6868,40
73 Ant 5: 5 -> 15 -> 10 -> 17 -> 13 -> 3 -> 14 -> 11
    -> 9 -> 1 -> 18 -> 19 -> 2 -> 7 -> 4 -> 12 -> 16
    -> 8 -> 6 -> 5 | Length = 6352,04
74 Ant 6: 6 -> 16 -> 12 -> 15 -> 19 -> 11 -> 9 -> 5 ->
    13 -> 2 -> 8 -> 3 -> 10 -> 4 -> 1 -> 14 -> 18 -> 7
    -> 17 -> 6 | Length = 6091,68
75 Ant 7: 7 -> 18 -> 13 -> 15 -> 4 -> 5 -> 16 -> 6 ->
    12 -> 9 -> 10 -> 17 -> 8 -> 1 -> 3 -> 19 -> 2 -> 11
    -> 14 -> 7 | Length = 6297,12
76 Ant 8: 8 -> 12 -> 1 -> 9 -> 15 -> 17 -> 13 -> 10 ->
    3 -> 2 -> 7 -> 5 -> 4 -> 11 -> 14 -> 16 -> 18 -> 19
    -> 6 -> 8 | Length = 6591,47

```

```

77 Ant 9: 9 -> 17 -> 11 -> 12 -> 5 -> 6 -> 18 -> 2 -> 1
-> 10 -> 3 -> 7 -> 8 -> 16 -> 15 -> 19 -> 13 -> 14
-> 4 -> 9 | Length = 6463,13
78 Ant 10: 10 -> 16 -> 14 -> 6 -> 1 -> 3 -> 19 -> 4 ->
9 -> 13 -> 18 -> 2 -> 11 -> 15 -> 8 -> 17 -> 7 -> 12
-> 5 -> 10 | Length = 5488,22
79 Ant 11: 11 -> 2 -> 9 -> 12 -> 17 -> 14 -> 1 -> 4 ->
7 -> 18 -> 5 -> 6 -> 15 -> 8 -> 13 -> 19 -> 16 -> 10
-> 3 -> 11 | Length = 6541,92
80 Ant 12: 12 -> 5 -> 16 -> 8 -> 19 -> 10 -> 17 -> 9
-> 1 -> 14 -> 15 -> 7 -> 3 -> 2 -> 6 -> 18 -> 11
-> 4 -> 13 -> 12 | Length = 6984,23
81 Ant 13: 13 -> 14 -> 8 -> 15 -> 16 -> 18 -> 7 -> 4
-> 5 -> 1 -> 6 -> 19 -> 12 -> 9 -> 17 -> 11 -> 3
-> 10 -> 2 -> 13 | Length = 6651,65
82 Ant 14: 14 -> 19 -> 17 -> 11 -> 15 -> 13 -> 3 -> 8
-> 5 -> 6 -> 1 -> 18 -> 16 -> 4 -> 12 -> 10 -> 9
-> 2 -> 7 -> 14 | Length = 6482,77
83 Ant 15: 15 -> 11 -> 10 -> 4 -> 17 -> 18 -> 14 -> 1
-> 7 -> 2 -> 5 -> 3 -> 13 -> 8 -> 16 -> 9 -> 12 ->
6 -> 19 -> 15 | Length = 6162,41
84 Ant 16: 16 -> 6 -> 14 -> 1 -> 7 -> 4 -> 12 -> 9 ->
15 -> 3 -> 18 -> 13 -> 8 -> 10 -> 19 -> 2 -> 17 -> 5
-> 11 -> 16 | Length = 5673,36
85 Ant 17: 17 -> 4 -> 2 -> 1 -> 15 -> 12 -> 8 -> 5 ->
13 -> 19 -> 9 -> 14 -> 3 -> 6 -> 18 -> 7 -> 11 -> 16
-> 10 -> 17 | Length = 5652,07
86 Ant 18: 18 -> 13 -> 6 -> 1 -> 7 -> 14 -> 15 -> 19
-> 2 -> 10 -> 8 -> 16 -> 5 -> 4 -> 17 -> 9 -> 11
-> 12 -> 3 -> 18 | Length = 6393,59
87 Ant 19: 19 -> 17 -> 6 -> 8 -> 9 -> 15 -> 5 -> 14 ->
11 -> 7 -> 12 -> 4 -> 1 -> 18 -> 2 -> 13 -> 10 -> 16
-> 3 -> 19 | Length = 6715,79
88 Best so far: 5488,22
89
90 ===== Iteration 5 =====
91 Ant 1: 1 -> 15 -> 7 -> 3 -> 13 -> 18 -> 14 -> 5 -> 6
-> 9 -> 4 -> 8 -> 16 -> 19 -> 17 -> 12 -> 10 -> 2
-> 11 -> 1 | Length = 7682,29
92 Ant 2: 2 -> 15 -> 11 -> 9 -> 13 -> 12 -> 3 -> 18 ->
6 -> 17 -> 8 -> 5 -> 4 -> 19 -> 14 -> 16 -> 10 -> 1

```

```

92  -> 7 -> 2 | Length = 6127,33
93 Ant 3: 3 -> 7 -> 2 -> 10 -> 14 -> 1 -> 4 -> 9 -> 17
    -> 18 -> 8 -> 11 -> 13 -> 5 -> 12 -> 6 -> 19 -> 15
    -> 16 -> 3 | Length = 5875,49
94 Ant 4: 4 -> 10 -> 7 -> 19 -> 15 -> 3 -> 9 -> 17 -> 8
    -> 16 -> 2 -> 13 -> 18 -> 6 -> 14 -> 1 -> 5 -> 12
    -> 11 -> 4 | Length = 6578,91
95 Ant 5: 5 -> 10 -> 11 -> 19 -> 6 -> 13 -> 3 -> 15 ->
    16 -> 12 -> 1 -> 9 -> 18 -> 7 -> 14 -> 17 -> 4 -> 2
    -> 8 -> 5 | Length = 6189,49
96 Ant 6: 6 -> 14 -> 19 -> 17 -> 9 -> 2 -> 10 -> 16 ->
    5 -> 15 -> 11 -> 1 -> 18 -> 8 -> 3 -> 7 -> 4 -> 12
    -> 13 -> 6 | Length = 6630,16
97 Ant 7: 7 -> 1 -> 13 -> 3 -> 19 -> 18 -> 12 -> 9 -> 8
    -> 16 -> 17 -> 11 -> 5 -> 6 -> 15 -> 10 -> 2 -> 4
    -> 14 -> 7 | Length = 6774,34
98 Ant 8: 8 -> 10 -> 12 -> 14 -> 9 -> 18 -> 16 -> 17
    -> 6 -> 19 -> 2 -> 11 -> 7 -> 1 -> 4 -> 3 -> 13 ->
    5 -> 15 -> 8 | Length = 7103,71
99 Ant 9: 9 -> 2 -> 6 -> 15 -> 16 -> 3 -> 5 -> 17 -> 7
    -> 1 -> 14 -> 19 -> 12 -> 10 -> 4 -> 11 -> 13 -> 18
    -> 8 -> 9 | Length = 6498,66
100 Ant 10: 10 -> 3 -> 16 -> 13 -> 8 -> 14 -> 11 -> 12
    -> 19 -> 6 -> 1 -> 2 -> 9 -> 4 -> 5 -> 17 -> 15 ->
    7 -> 18 -> 10 | Length = 6702,00
101 Ant 11: 11 -> 2 -> 13 -> 16 -> 5 -> 4 -> 17 -> 18
    -> 7 -> 6 -> 9 -> 1 -> 3 -> 8 -> 15 -> 14 -> 12 ->
    19 -> 10 -> 11 | Length = 6644,34
102 Ant 12: 12 -> 5 -> 7 -> 2 -> 9 -> 16 -> 8 -> 19 ->
    17 -> 6 -> 1 -> 13 -> 4 -> 10 -> 3 -> 18 -> 14 -> 15
    -> 11 -> 12 | Length = 6717,40
103 Ant 13: 13 -> 9 -> 15 -> 12 -> 16 -> 11 -> 5 -> 2
    -> 4 -> 3 -> 10 -> 1 -> 7 -> 18 -> 14 -> 8 -> 6 ->
    17 -> 19 -> 13 | Length = 5887,52
104 Ant 14: 14 -> 19 -> 16 -> 9 -> 6 -> 17 -> 4 -> 10
    -> 11 -> 12 -> 7 -> 1 -> 3 -> 15 -> 2 -> 8 -> 13
    -> 18 -> 5 -> 14 | Length = 7293,94
105 Ant 15: 15 -> 11 -> 1 -> 14 -> 6 -> 9 -> 10 -> 19
    -> 16 -> 12 -> 18 -> 7 -> 4 -> 2 -> 3 -> 13 -> 5
    -> 17 -> 8 -> 15 | Length = 5350,14
106 Ant 16: 16 -> 12 -> 10 -> 4 -> 7 -> 1 -> 14 -> 5 ->

```

```

106 9 -> 15 -> 3 -> 19 -> 2 -> 8 -> 6 -> 18 -> 13 -> 11
    -> 17 -> 16 | Length = 6349,63
107 Ant 17: 17 -> 15 -> 9 -> 4 -> 18 -> 5 -> 16 -> 11
    -> 19 -> 3 -> 7 -> 1 -> 6 -> 14 -> 13 -> 8 -> 12
    -> 10 -> 2 -> 17 | Length = 5812,68
108 Ant 18: 18 -> 1 -> 14 -> 17 -> 4 -> 10 -> 3 -> 2 ->
    5 -> 9 -> 19 -> 16 -> 8 -> 6 -> 7 -> 13 -> 11 -> 12
    -> 15 -> 18 | Length = 6655,00
109 Ant 19: 19 -> 12 -> 10 -> 13 -> 18 -> 5 -> 4 -> 9
    -> 14 -> 1 -> 2 -> 17 -> 8 -> 11 -> 6 -> 3 -> 7 ->
    15 -> 16 -> 19 | Length = 6961,27
110 Best so far: 5350,14
111
112 ===== Iteration 6 =====
113 Ant 1: 1 -> 6 -> 5 -> 16 -> 8 -> 14 -> 4 -> 12 -> 17
    -> 10 -> 2 -> 7 -> 3 -> 15 -> 19 -> 13 -> 11 -> 9
    -> 18 -> 1 | Length = 6442,65
114 Ant 2: 2 -> 15 -> 3 -> 5 -> 6 -> 9 -> 14 -> 1 -> 10
    -> 12 -> 18 -> 17 -> 19 -> 8 -> 16 -> 13 -> 4 -> 7
    -> 11 -> 2 | Length = 7256,26
115 Ant 3: 3 -> 12 -> 14 -> 11 -> 17 -> 16 -> 2 -> 7 ->
    1 -> 6 -> 19 -> 13 -> 9 -> 15 -> 8 -> 18 -> 5 -> 10
    -> 4 -> 3 | Length = 5570,23
116 Ant 4: 4 -> 5 -> 6 -> 8 -> 16 -> 18 -> 7 -> 3 -> 19
    -> 13 -> 17 -> 10 -> 2 -> 9 -> 15 -> 12 -> 11 -> 1
    -> 14 -> 4 | Length = 6409,77
117 Ant 5: 5 -> 12 -> 6 -> 13 -> 15 -> 2 -> 16 -> 10 ->
    9 -> 17 -> 3 -> 14 -> 1 -> 7 -> 18 -> 8 -> 19 -> 4
    -> 11 -> 5 | Length = 6479,65
118 Ant 6: 6 -> 19 -> 16 -> 8 -> 18 -> 13 -> 2 -> 1 -> 3
    -> 14 -> 11 -> 17 -> 4 -> 5 -> 15 -> 9 -> 7 -> 10
    -> 12 -> 6 | Length = 6340,48
119 Ant 7: 7 -> 11 -> 8 -> 16 -> 10 -> 4 -> 19 -> 6 ->
    17 -> 9 -> 14 -> 13 -> 18 -> 5 -> 2 -> 1 -> 12 -> 3
    -> 15 -> 7 | Length = 6978,78
120 Ant 8: 8 -> 4 -> 11 -> 2 -> 7 -> 17 -> 10 -> 12 ->
    16 -> 15 -> 14 -> 1 -> 18 -> 13 -> 3 -> 19 -> 6 -> 5
    -> 9 -> 8 | Length = 6572,57
121 Ant 9: 9 -> 11 -> 12 -> 16 -> 1 -> 5 -> 14 -> 18 ->
    19 -> 6 -> 7 -> 4 -> 10 -> 17 -> 3 -> 15 -> 2 -> 13
    -> 8 -> 9 | Length = 5918,96

```

```

122 Ant 10: 10 -> 2 -> 15 -> 11 -> 3 -> 13 -> 18 -> 19
    -> 12 -> 16 -> 17 -> 9 -> 14 -> 6 -> 5 -> 8 -> 4
    -> 7 -> 1 -> 10 | Length = 6501,47
123 Ant 11: 11 -> 8 -> 16 -> 12 -> 19 -> 4 -> 9 -> 10
    -> 14 -> 1 -> 5 -> 18 -> 7 -> 3 -> 6 -> 17 -> 2 ->
    15 -> 13 -> 11 | Length = 6265,65
124 Ant 12: 12 -> 11 -> 2 -> 10 -> 4 -> 8 -> 1 -> 18 ->
    13 -> 3 -> 5 -> 17 -> 14 -> 9 -> 16 -> 19 -> 15 -> 7
    -> 6 -> 12 | Length = 7373,94
125 Ant 13: 13 -> 18 -> 8 -> 17 -> 6 -> 12 -> 15 -> 1
    -> 10 -> 3 -> 5 -> 9 -> 14 -> 19 -> 16 -> 2 -> 7
    -> 4 -> 11 -> 13 | Length = 6753,10
126 Ant 14: 14 -> 12 -> 7 -> 11 -> 5 -> 8 -> 2 -> 18 ->
    1 -> 13 -> 16 -> 3 -> 4 -> 19 -> 15 -> 9 -> 17 -> 6
    -> 10 -> 14 | Length = 6271,71
127 Ant 15: 15 -> 7 -> 3 -> 13 -> 18 -> 5 -> 12 -> 10
    -> 16 -> 19 -> 2 -> 4 -> 1 -> 6 -> 17 -> 8 -> 14
    -> 9 -> 11 -> 15 | Length = 7388,93
128 Ant 16: 16 -> 10 -> 1 -> 7 -> 18 -> 2 -> 17 -> 11
    -> 12 -> 13 -> 5 -> 9 -> 3 -> 15 -> 19 -> 6 -> 14
    -> 8 -> 4 -> 16 | Length = 6253,02
129 Ant 17: 17 -> 6 -> 19 -> 3 -> 1 -> 16 -> 8 -> 10 ->
    15 -> 13 -> 18 -> 7 -> 11 -> 14 -> 2 -> 5 -> 12 -> 9
    -> 4 -> 17 | Length = 6186,09
130 Ant 18: 18 -> 7 -> 1 -> 2 -> 13 -> 17 -> 4 -> 5 ->
    15 -> 16 -> 8 -> 14 -> 19 -> 9 -> 11 -> 12 -> 10 ->
    3 -> 6 -> 18 | Length = 5936,59
131 Ant 19: 19 -> 7 -> 1 -> 12 -> 10 -> 8 -> 17 -> 6 ->
    4 -> 9 -> 11 -> 13 -> 3 -> 5 -> 2 -> 16 -> 14 -> 15
    -> 18 -> 19 | Length = 6965,46
132 Best so far: 5350,14
133
134 ===== Iteration 7 =====
135 Ant 1: 1 -> 12 -> 14 -> 8 -> 11 -> 2 -> 5 -> 6 -> 17
    -> 19 -> 16 -> 3 -> 10 -> 4 -> 15 -> 18 -> 13 -> 9
    -> 7 -> 1 | Length = 6966,75
136 Ant 2: 2 -> 1 -> 16 -> 8 -> 10 -> 4 -> 6 -> 19 -> 7
    -> 11 -> 17 -> 9 -> 5 -> 12 -> 15 -> 3 -> 13 -> 14
    -> 18 -> 2 | Length = 6374,44
137 Ant 3: 3 -> 10 -> 16 -> 8 -> 14 -> 15 -> 11 -> 4 ->
    1 -> 5 -> 12 -> 6 -> 19 -> 17 -> 9 -> 18 -> 13 -> 7

```

```

137  -> 2 -> 3 | Length = 7091,87
138 Ant 4: 4 -> 7 -> 8 -> 16 -> 15 -> 2 -> 10 -> 17 -> 6
      -> 19 -> 18 -> 13 -> 3 -> 1 -> 9 -> 14 -> 12 -> 11
      -> 5 -> 4 | Length = 6649,30
139 Ant 5: 5 -> 8 -> 14 -> 9 -> 15 -> 2 -> 16 -> 12 -> 3
      -> 4 -> 10 -> 7 -> 18 -> 1 -> 13 -> 17 -> 6 -> 19
      -> 11 -> 5 | Length = 6662,43
140 Ant 6: 6 -> 5 -> 4 -> 9 -> 14 -> 1 -> 18 -> 17 -> 11
      -> 13 -> 3 -> 8 -> 2 -> 15 -> 7 -> 12 -> 16 -> 10
      -> 19 -> 6 | Length = 7632,75
141 Ant 7: 7 -> 4 -> 10 -> 16 -> 15 -> 13 -> 8 -> 17 ->
      11 -> 2 -> 5 -> 12 -> 3 -> 19 -> 9 -> 14 -> 1 -> 6
      -> 18 -> 7 | Length = 5614,73
142 Ant 8: 8 -> 15 -> 11 -> 4 -> 5 -> 3 -> 7 -> 6 -> 2
      -> 1 -> 16 -> 9 -> 10 -> 17 -> 13 -> 18 -> 14 -> 12
      -> 19 -> 8 | Length = 5666,69
143 Ant 9: 9 -> 10 -> 16 -> 14 -> 6 -> 19 -> 15 -> 17
      -> 13 -> 3 -> 7 -> 11 -> 12 -> 1 -> 2 -> 4 -> 5 ->
      18 -> 8 -> 9 | Length = 6139,16
144 Ant 10: 10 -> 15 -> 3 -> 13 -> 5 -> 18 -> 14 -> 1
      -> 12 -> 11 -> 19 -> 6 -> 17 -> 9 -> 16 -> 2 -> 7
      -> 4 -> 8 -> 10 | Length = 6067,33
145 Ant 11: 11 -> 19 -> 15 -> 16 -> 8 -> 12 -> 7 -> 4
      -> 2 -> 13 -> 9 -> 18 -> 1 -> 10 -> 3 -> 6 -> 17
      -> 14 -> 5 -> 11 | Length = 6319,07
146 Ant 12: 12 -> 16 -> 2 -> 8 -> 15 -> 9 -> 11 -> 3 ->
      5 -> 6 -> 17 -> 13 -> 4 -> 14 -> 1 -> 10 -> 7 -> 18
      -> 19 -> 12 | Length = 5924,34
147 Ant 13: 13 -> 5 -> 12 -> 4 -> 1 -> 6 -> 8 -> 16 ->
      19 -> 18 -> 14 -> 15 -> 11 -> 9 -> 17 -> 10 -> 7 ->
      3 -> 2 -> 13 | Length = 6700,51
148 Ant 14: 14 -> 19 -> 8 -> 10 -> 5 -> 3 -> 15 -> 9 ->
      11 -> 4 -> 18 -> 7 -> 6 -> 1 -> 2 -> 16 -> 12 -> 13
      -> 17 -> 14 | Length = 5611,97
149 Ant 15: 15 -> 9 -> 11 -> 12 -> 16 -> 13 -> 14 -> 19
      -> 17 -> 18 -> 5 -> 6 -> 3 -> 2 -> 7 -> 1 -> 4 ->
      10 -> 8 -> 15 | Length = 6012,64
150 Ant 16: 16 -> 2 -> 10 -> 4 -> 9 -> 1 -> 6 -> 19 ->
      12 -> 11 -> 17 -> 7 -> 5 -> 15 -> 3 -> 13 -> 18 -> 8
      -> 14 -> 16 | Length = 7268,37
151 Ant 17: 17 -> 7 -> 1 -> 13 -> 11 -> 12 -> 10 -> 4

```

```

151  -> 19 -> 18 -> 5 -> 2 -> 16 -> 8 -> 3 -> 15 -> 9
      -> 6 -> 14 -> 17 | Length = 6269,40
152 Ant 18: 18 -> 7 -> 15 -> 14 -> 2 -> 8 -> 19 -> 10
      -> 16 -> 3 -> 13 -> 9 -> 17 -> 6 -> 12 -> 5 -> 11
      -> 4 -> 1 -> 18 | Length = 6562,33
153 Ant 19: 19 -> 16 -> 13 -> 8 -> 15 -> 1 -> 14 -> 5
      -> 2 -> 9 -> 4 -> 11 -> 12 -> 10 -> 3 -> 7 -> 18
      -> 17 -> 6 -> 19 | Length = 6809,86
154 Best so far: 5350,14
155
156 ===== Iteration 8 =====
157 Ant 1: 1 -> 4 -> 16 -> 3 -> 13 -> 9 -> 17 -> 7 -> 6
      -> 19 -> 8 -> 14 -> 5 -> 12 -> 11 -> 2 -> 10 -> 18
      -> 15 -> 1 | Length = 7143,86
158 Ant 2: 2 -> 5 -> 3 -> 9 -> 15 -> 7 -> 11 -> 8 -> 10
      -> 12 -> 4 -> 1 -> 6 -> 19 -> 18 -> 17 -> 14 -> 16
      -> 13 -> 2 | Length = 6948,96
159 Ant 3: 3 -> 15 -> 19 -> 10 -> 4 -> 5 -> 18 -> 7 -> 1
      -> 2 -> 13 -> 9 -> 11 -> 17 -> 6 -> 12 -> 8 -> 16
      -> 14 -> 3 | Length = 6227,15
160 Ant 4: 4 -> 3 -> 2 -> 16 -> 5 -> 11 -> 7 -> 6 -> 10
      -> 8 -> 15 -> 13 -> 18 -> 19 -> 14 -> 17 -> 12 -> 9
      -> 1 -> 4 | Length = 6713,24
161 Ant 5: 5 -> 4 -> 7 -> 1 -> 14 -> 3 -> 13 -> 11 -> 17
      -> 19 -> 16 -> 12 -> 8 -> 18 -> 6 -> 15 -> 2 -> 9
      -> 10 -> 5 | Length = 6951,62
162 Ant 6: 6 -> 12 -> 4 -> 10 -> 15 -> 3 -> 13 -> 9 ->
      11 -> 8 -> 16 -> 19 -> 14 -> 5 -> 2 -> 1 -> 18 -> 7
      -> 17 -> 6 | Length = 6799,97
163 Ant 7: 7 -> 3 -> 16 -> 1 -> 18 -> 13 -> 4 -> 11 -> 2
      -> 6 -> 8 -> 9 -> 10 -> 12 -> 19 -> 15 -> 5 -> 17
      -> 14 -> 7 | Length = 5830,97
164 Ant 8: 8 -> 14 -> 12 -> 16 -> 15 -> 19 -> 17 -> 9
      -> 4 -> 5 -> 6 -> 1 -> 10 -> 7 -> 3 -> 13 -> 11 ->
      2 -> 18 -> 8 | Length = 6565,24
165 Ant 9: 9 -> 10 -> 4 -> 7 -> 1 -> 12 -> 14 -> 5 -> 6
      -> 17 -> 19 -> 2 -> 11 -> 15 -> 13 -> 18 -> 8 -> 16
      -> 3 -> 9 | Length = 6434,40
166 Ant 10: 10 -> 4 -> 5 -> 9 -> 12 -> 14 -> 1 -> 16 ->
      8 -> 19 -> 15 -> 3 -> 7 -> 2 -> 11 -> 13 -> 18 -> 17
      -> 6 -> 10 | Length = 5880,21

```

```

167 Ant 11: 11 -> 12 -> 14 -> 18 -> 13 -> 8 -> 9 -> 2
    -> 15 -> 16 -> 10 -> 3 -> 4 -> 5 -> 1 -> 6 -> 19
    -> 17 -> 7 -> 11 | Length = 6531,74
168 Ant 12: 12 -> 16 -> 3 -> 15 -> 2 -> 1 -> 4 -> 11 ->
    9 -> 13 -> 7 -> 18 -> 14 -> 19 -> 6 -> 5 -> 8 -> 17
    -> 10 -> 12 | Length = 6301,97
169 Ant 13: 13 -> 11 -> 19 -> 6 -> 17 -> 14 -> 4 -> 2
    -> 1 -> 9 -> 15 -> 16 -> 12 -> 7 -> 10 -> 3 -> 18
    -> 5 -> 8 -> 13 | Length = 5977,22
170 Ant 14: 14 -> 19 -> 15 -> 7 -> 3 -> 8 -> 16 -> 13
    -> 1 -> 11 -> 2 -> 5 -> 18 -> 9 -> 17 -> 6 -> 12
    -> 10 -> 4 -> 14 | Length = 7131,94
171 Ant 15: 15 -> 16 -> 2 -> 4 -> 14 -> 13 -> 17 -> 11
    -> 19 -> 12 -> 9 -> 10 -> 3 -> 8 -> 5 -> 1 -> 6 ->
    18 -> 7 -> 15 | Length = 6430,49
172 Ant 16: 16 -> 15 -> 9 -> 2 -> 1 -> 10 -> 4 -> 8 ->
    17 -> 13 -> 18 -> 5 -> 12 -> 6 -> 19 -> 3 -> 7 -> 11
    -> 14 -> 16 | Length = 6843,67
173 Ant 17: 17 -> 16 -> 12 -> 9 -> 19 -> 6 -> 5 -> 3 ->
    2 -> 14 -> 4 -> 11 -> 13 -> 8 -> 15 -> 7 -> 18 -> 1
    -> 10 -> 17 | Length = 6105,60
174 Ant 18: 18 -> 7 -> 4 -> 14 -> 12 -> 11 -> 2 -> 8 ->
    16 -> 1 -> 10 -> 3 -> 17 -> 6 -> 5 -> 9 -> 13 -> 19
    -> 15 -> 18 | Length = 5568,89
175 Ant 19: 19 -> 18 -> 5 -> 6 -> 14 -> 9 -> 1 -> 15 ->
    3 -> 7 -> 2 -> 4 -> 10 -> 8 -> 16 -> 12 -> 11 -> 17
    -> 13 -> 19 | Length = 6042,27
176 Best so far: 5350,14
177
178 ===== Iteration 9 =====
179 Ant 1: 1 -> 14 -> 4 -> 7 -> 2 -> 11 -> 13 -> 3 -> 15
    -> 19 -> 9 -> 18 -> 6 -> 5 -> 8 -> 12 -> 16 -> 10
    -> 17 -> 1 | Length = 5854,76
180 Ant 2: 2 -> 15 -> 12 -> 10 -> 3 -> 5 -> 18 -> 19 ->
    8 -> 16 -> 4 -> 1 -> 6 -> 17 -> 11 -> 7 -> 14 -> 9
    -> 13 -> 2 | Length = 6831,01
181 Ant 3: 3 -> 8 -> 14 -> 2 -> 18 -> 13 -> 4 -> 9 -> 5
    -> 17 -> 10 -> 19 -> 6 -> 12 -> 11 -> 15 -> 16 -> 1
    -> 7 -> 3 | Length = 5687,40
182 Ant 4: 4 -> 5 -> 3 -> 13 -> 15 -> 18 -> 7 -> 1 -> 6
    -> 17 -> 11 -> 9 -> 12 -> 19 -> 8 -> 16 -> 10 -> 14

```

```

182  -> 2 -> 4 | Length = 6169,62
183 Ant 5: 5 -> 12 -> 9 -> 13 -> 16 -> 15 -> 3 -> 7 -> 2
      -> 11 -> 19 -> 6 -> 18 -> 8 -> 14 -> 4 -> 10 -> 1
      -> 17 -> 5 | Length = 6797,76
184 Ant 6: 6 -> 12 -> 1 -> 5 -> 18 -> 8 -> 13 -> 17 -> 7
      -> 3 -> 15 -> 9 -> 4 -> 10 -> 16 -> 19 -> 14 -> 11
      -> 2 -> 6 | Length = 6379,42
185 Ant 7: 7 -> 14 -> 3 -> 13 -> 9 -> 4 -> 1 -> 16 -> 12
      -> 6 -> 17 -> 10 -> 2 -> 5 -> 11 -> 15 -> 19 -> 18
      -> 8 -> 7 | Length = 5859,93
186 Ant 8: 8 -> 16 -> 12 -> 1 -> 6 -> 18 -> 13 -> 9 -> 3
      -> 4 -> 10 -> 5 -> 11 -> 7 -> 15 -> 2 -> 19 -> 17
      -> 14 -> 8 | Length = 6695,51
187 Ant 9: 9 -> 19 -> 15 -> 7 -> 4 -> 10 -> 1 -> 6 -> 5
      -> 8 -> 12 -> 3 -> 14 -> 17 -> 18 -> 13 -> 11 -> 2
      -> 16 -> 9 | Length = 6137,02
188 Ant 10: 10 -> 19 -> 17 -> 7 -> 11 -> 13 -> 2 -> 18
      -> 8 -> 12 -> 16 -> 15 -> 9 -> 4 -> 1 -> 5 -> 3 ->
      14 -> 6 -> 10 | Length = 6178,91
189 Ant 11: 11 -> 15 -> 9 -> 16 -> 1 -> 14 -> 5 -> 18
      -> 2 -> 13 -> 8 -> 10 -> 6 -> 7 -> 17 -> 12 -> 4
      -> 3 -> 19 -> 11 | Length = 6095,22
190 Ant 12: 12 -> 16 -> 8 -> 6 -> 19 -> 3 -> 1 -> 7 -> 4
      -> 9 -> 18 -> 5 -> 2 -> 11 -> 13 -> 17 -> 14 -> 15
      -> 10 -> 12 | Length = 6962,59
191 Ant 13: 13 -> 14 -> 4 -> 10 -> 12 -> 19 -> 7 -> 11
      -> 15 -> 17 -> 6 -> 18 -> 5 -> 8 -> 2 -> 1 -> 16
      -> 3 -> 9 -> 13 | Length = 6195,14
192 Ant 14: 14 -> 16 -> 2 -> 8 -> 5 -> 11 -> 15 -> 19
      -> 9 -> 12 -> 4 -> 10 -> 1 -> 6 -> 17 -> 3 -> 7 ->
      18 -> 13 -> 14 | Length = 6463,09
193 Ant 15: 15 -> 17 -> 6 -> 1 -> 14 -> 4 -> 10 -> 19
      -> 12 -> 5 -> 18 -> 7 -> 2 -> 16 -> 9 -> 11 -> 13
      -> 8 -> 3 -> 15 | Length = 6050,97
194 Ant 16: 16 -> 8 -> 4 -> 3 -> 9 -> 7 -> 18 -> 1 -> 6
      -> 12 -> 10 -> 2 -> 15 -> 11 -> 5 -> 17 -> 14 -> 19
      -> 13 -> 16 | Length = 6663,29
195 Ant 17: 17 -> 9 -> 15 -> 8 -> 10 -> 4 -> 7 -> 3 ->
      13 -> 18 -> 5 -> 11 -> 2 -> 16 -> 1 -> 6 -> 14 -> 12
      -> 19 -> 17 | Length = 5255,00
196 Ant 18: 18 -> 19 -> 8 -> 16 -> 15 -> 6 -> 17 -> 14

```

```

196  -> 5 -> 12 -> 10 -> 3 -> 7 -> 4 -> 2 -> 11 -> 9 ->
    13 -> 1 -> 18 | Length = 6522,04
197 Ant 19: 19 -> 6 -> 7 -> 17 -> 8 -> 4 -> 5 -> 18 ->
    10 -> 16 -> 12 -> 1 -> 9 -> 13 -> 11 -> 14 -> 3 ->
    15 -> 2 -> 19 | Length = 6691,48
198 Best so far: 5255,00
199
200 ===== Iteration 10 =====
201 Ant 1: 1 -> 16 -> 3 -> 15 -> 7 -> 2 -> 10 -> 9 -> 13
    -> 8 -> 18 -> 5 -> 12 -> 14 -> 4 -> 19 -> 11 -> 17
    -> 6 -> 1 | Length = 5603,55
202 Ant 2: 2 -> 3 -> 14 -> 12 -> 16 -> 19 -> 10 -> 9 ->
    4 -> 5 -> 18 -> 6 -> 1 -> 13 -> 11 -> 8 -> 15 -> 7
    -> 17 -> 2 | Length = 6436,56
203 Ant 3: 3 -> 17 -> 19 -> 9 -> 1 -> 4 -> 10 -> 2 -> 6
    -> 5 -> 12 -> 14 -> 8 -> 18 -> 13 -> 11 -> 15 -> 16
    -> 7 -> 3 | Length = 6854,78
204 Ant 4: 4 -> 16 -> 19 -> 12 -> 10 -> 3 -> 7 -> 18 ->
    5 -> 2 -> 11 -> 15 -> 14 -> 17 -> 8 -> 13 -> 1 -> 9
    -> 6 -> 4 | Length = 7526,61
205 Ant 5: 5 -> 2 -> 8 -> 4 -> 3 -> 13 -> 11 -> 15 -> 9
    -> 1 -> 14 -> 17 -> 19 -> 6 -> 18 -> 7 -> 10 -> 12
    -> 16 -> 5 | Length = 6527,05
206 Ant 6: 6 -> 1 -> 17 -> 13 -> 9 -> 12 -> 14 -> 19 ->
    18 -> 5 -> 11 -> 4 -> 7 -> 3 -> 15 -> 2 -> 8 -> 10
    -> 16 -> 6 | Length = 6512,33
207 Ant 7: 7 -> 18 -> 19 -> 6 -> 17 -> 13 -> 3 -> 8 ->
    14 -> 1 -> 12 -> 10 -> 4 -> 9 -> 11 -> 15 -> 2 -> 16
    -> 5 -> 7 | Length = 6713,85
208 Ant 8: 8 -> 19 -> 17 -> 5 -> 18 -> 13 -> 3 -> 15 ->
    7 -> 2 -> 11 -> 9 -> 16 -> 10 -> 12 -> 6 -> 14 -> 4
    -> 1 -> 8 | Length = 6310,72
209 Ant 9: 9 -> 5 -> 4 -> 10 -> 17 -> 11 -> 7 -> 16 -> 8
    -> 18 -> 2 -> 19 -> 13 -> 15 -> 3 -> 14 -> 1 -> 6
    -> 12 -> 9 | Length = 5972,68
210 Ant 10: 10 -> 1 -> 5 -> 8 -> 16 -> 14 -> 11 -> 17
    -> 19 -> 15 -> 9 -> 13 -> 18 -> 2 -> 6 -> 3 -> 7
    -> 4 -> 12 -> 10 | Length = 5319,46
211 Ant 11: 11 -> 12 -> 10 -> 3 -> 13 -> 9 -> 14 -> 5
    -> 8 -> 18 -> 7 -> 17 -> 19 -> 6 -> 1 -> 15 -> 2
    -> 4 -> 16 -> 11 | Length = 6524,52

```

```

212 Ant 12: 12 -> 6 -> 18 -> 1 -> 14 -> 13 -> 16 -> 15
    -> 5 -> 8 -> 10 -> 4 -> 2 -> 11 -> 7 -> 3 -> 17 ->
    9 -> 19 -> 12 | Length = 6304,18
213 Ant 13: 13 -> 17 -> 18 -> 10 -> 4 -> 12 -> 16 -> 1
    -> 3 -> 14 -> 8 -> 2 -> 15 -> 9 -> 19 -> 6 -> 7 ->
    11 -> 5 -> 13 | Length = 5729,34
214 Ant 14: 14 -> 15 -> 9 -> 11 -> 7 -> 18 -> 19 -> 17
    -> 10 -> 4 -> 5 -> 6 -> 12 -> 1 -> 16 -> 3 -> 13
    -> 2 -> 8 -> 14 | Length = 6062,66
215 Ant 15: 15 -> 9 -> 12 -> 17 -> 6 -> 2 -> 4 -> 5 ->
    18 -> 7 -> 3 -> 8 -> 13 -> 11 -> 14 -> 1 -> 10 -> 19
    -> 16 -> 15 | Length = 5863,93
216 Ant 16: 16 -> 2 -> 7 -> 18 -> 13 -> 15 -> 11 -> 12
    -> 5 -> 8 -> 10 -> 4 -> 9 -> 14 -> 6 -> 1 -> 17 ->
    19 -> 3 -> 16 | Length = 5535,35
217 Ant 17: 17 -> 6 -> 19 -> 14 -> 12 -> 10 -> 8 -> 3
    -> 15 -> 2 -> 13 -> 16 -> 1 -> 7 -> 11 -> 5 -> 9
    -> 4 -> 18 -> 17 | Length = 6503,55
218 Ant 18: 18 -> 19 -> 10 -> 7 -> 11 -> 13 -> 8 -> 16
    -> 2 -> 4 -> 5 -> 6 -> 1 -> 9 -> 3 -> 12 -> 14 ->
    17 -> 15 -> 18 | Length = 6504,13
219 Ant 19: 19 -> 18 -> 7 -> 6 -> 14 -> 5 -> 9 -> 11 ->
    12 -> 16 -> 10 -> 3 -> 1 -> 17 -> 8 -> 13 -> 2 -> 15
    -> 4 -> 19 | Length = 5509,53
220 Best so far: 5255,00
221
222 ===== Iteration 11 =====
223 Ant 1: 1 -> 6 -> 12 -> 5 -> 18 -> 8 -> 2 -> 4 -> 7
    -> 3 -> 14 -> 17 -> 13 -> 11 -> 15 -> 9 -> 19 -> 16
    -> 10 -> 1 | Length = 5958,47
224 Ant 2: 2 -> 15 -> 7 -> 3 -> 16 -> 8 -> 17 -> 19 -> 4
    -> 1 -> 5 -> 12 -> 6 -> 14 -> 9 -> 10 -> 18 -> 13
    -> 11 -> 2 | Length = 6745,35
225 Ant 3: 3 -> 9 -> 15 -> 16 -> 19 -> 17 -> 11 -> 2 ->
    10 -> 1 -> 6 -> 18 -> 7 -> 4 -> 12 -> 14 -> 8 -> 5
    -> 13 -> 3 | Length = 5663,09
226 Ant 4: 4 -> 7 -> 18 -> 19 -> 15 -> 13 -> 8 -> 14 ->
    3 -> 5 -> 11 -> 2 -> 10 -> 17 -> 9 -> 16 -> 12 -> 1
    -> 6 -> 4 | Length = 5308,60
227 Ant 5: 5 -> 8 -> 15 -> 9 -> 1 -> 16 -> 3 -> 10 -> 4
    -> 12 -> 19 -> 2 -> 11 -> 13 -> 17 -> 6 -> 18 -> 7

```

|     |         |  |                  |
|-----|---------|--|------------------|
| 227 | -> 14   | -> 5   | Length = 5498,28 |
| 228 | Ant 6:  | 6 -> 19 -> 3 -> 1 -> 11 -> 7 -> 15 -> 16 -> 8<br>-> 2 -> 18 -> 4 -> 10 -> 17 -> 5 -> 12 -> 14 -> 9<br>-> 13 -> 6   Length = 6453,80  |                  |
| 229 | Ant 7:  | 7 -> 11 -> 15 -> 13 -> 3 -> 5 -> 14 -> 8 -> 2<br>-> 4 -> 9 -> 10 -> 19 -> 18 -> 6 -> 17 -> 16 -> 12<br>-> 1 -> 7   Length = 6815,24  |                  |
| 230 | Ant 8:  | 8 -> 4 -> 3 -> 14 -> 6 -> 1 -> 7 -> 18 -> 2<br>-> 19 -> 9 -> 13 -> 11 -> 12 -> 10 -> 16 -> 15 -> 5<br>-> 17 -> 8   Length = 5109,45  |                  |
| 231 | Ant 9:  | 9 -> 13 -> 18 -> 19 -> 11 -> 2 -> 15 -> 1 -><br>16 -> 3 -> 14 -> 8 -> 17 -> 6 -> 12 -> 10 -> 4 -> 7<br>-> 5 -> 9   Length = 5890,38  |                  |
| 232 | Ant 10: | 10 -> 3 -> 13 -> 8 -> 5 -> 4 -> 14 -> 19 -><br>18 -> 7 -> 2 -> 16 -> 9 -> 1 -> 6 -> 12 -> 11 -> 15<br>-> 17 -> 10   Length = 5561,89 |                  |
| 233 | Ant 11: | 11 -> 17 -> 15 -> 16 -> 6 -> 3 -> 14 -> 4<br>-> 9 -> 1 -> 7 -> 19 -> 18 -> 5 -> 10 -> 12 -> 8<br>-> 13 -> 2 -> 11   Length = 6347,78 |                  |
| 234 | Ant 12: | 12 -> 11 -> 7 -> 6 -> 5 -> 10 -> 4 -> 15 -><br>16 -> 14 -> 17 -> 1 -> 3 -> 8 -> 18 -> 13 -> 2 -> 19<br>-> 9 -> 12   Length = 6878,37 |                  |
| 235 | Ant 13: | 13 -> 16 -> 10 -> 8 -> 17 -> 6 -> 7 -> 4 -><br>2 -> 1 -> 9 -> 11 -> 14 -> 18 -> 5 -> 12 -> 15 -> 3<br>-> 19 -> 13   Length = 6541,19 |                  |
| 236 | Ant 14: | 14 -> 12 -> 16 -> 11 -> 15 -> 18 -> 13 -> 8<br>-> 5 -> 4 -> 2 -> 6 -> 17 -> 9 -> 1 -> 10 -> 19 -><br>3 -> 7 -> 14   Length = 5907,38 |                  |
| 237 | Ant 15: | 15 -> 16 -> 2 -> 7 -> 18 -> 1 -> 6 -> 17 -><br>19 -> 9 -> 5 -> 4 -> 10 -> 12 -> 3 -> 13 -> 8 -> 14<br>-> 11 -> 15   Length = 5559,87 |                  |
| 238 | Ant 16: | 16 -> 8 -> 4 -> 7 -> 1 -> 14 -> 12 -> 10 -><br>18 -> 3 -> 15 -> 11 -> 2 -> 6 -> 19 -> 9 -> 13 -> 17<br>-> 5 -> 16   Length = 5835,56 |                  |
| 239 | Ant 17: | 17 -> 7 -> 11 -> 2 -> 13 -> 12 -> 16 -> 18<br>-> 6 -> 19 -> 15 -> 9 -> 5 -> 8 -> 4 -> 1 -> 10 -><br>3 -> 14 -> 17   Length = 6579,92 |                  |
| 240 | Ant 18: | 18 -> 7 -> 11 -> 16 -> 10 -> 8 -> 2 -> 15<br>-> 17 -> 19 -> 12 -> 4 -> 1 -> 6 -> 5 -> 14 -> 13<br>-> 3 -> 9 -> 18   Length = 7549,48 |                  |
| 241 | Ant 19: | 19 -> 14 -> 9 -> 5 -> 6 -> 7 -> 3 -> 10 ->   |                  |

```

241 16 -> 1 -> 2 -> 15 -> 11 -> 13 -> 18 -> 4 -> 8 -> 12
-> 17 -> 19 | Length = 6257,33
242 Best so far: 5109,45
243
244 ===== Iteration 12 =====
245 Ant 1: 1 -> 4 -> 2 -> 11 -> 15 -> 19 -> 17 -> 6 ->
14 -> 12 -> 10 -> 5 -> 18 -> 7 -> 3 -> 16 -> 8 -> 13
-> 9 -> 1 | Length = 5480,58
246 Ant 2: 2 -> 15 -> 11 -> 9 -> 19 -> 10 -> 1 -> 3 -> 4
-> 7 -> 6 -> 5 -> 18 -> 14 -> 12 -> 16 -> 8 -> 13
-> 17 -> 2 | Length = 5784,20
247 Ant 3: 3 -> 5 -> 4 -> 9 -> 13 -> 8 -> 17 -> 15 -> 16
-> 6 -> 14 -> 1 -> 18 -> 7 -> 12 -> 11 -> 2 -> 10
-> 19 -> 3 | Length = 5842,43
248 Ant 4: 4 -> 10 -> 3 -> 7 -> 11 -> 9 -> 2 -> 15 -> 18
-> 6 -> 1 -> 16 -> 19 -> 17 -> 14 -> 12 -> 5 -> 8
-> 13 -> 4 | Length = 6527,17
249 Ant 5: 5 -> 8 -> 14 -> 4 -> 13 -> 3 -> 1 -> 17 -> 18
-> 19 -> 9 -> 16 -> 12 -> 6 -> 7 -> 15 -> 11 -> 2
-> 10 -> 5 | Length = 6038,77
250 Ant 6: 6 -> 1 -> 12 -> 10 -> 5 -> 11 -> 14 -> 3 ->
13 -> 8 -> 18 -> 7 -> 2 -> 15 -> 16 -> 9 -> 19 -> 17
-> 4 -> 6 | Length = 5547,89
251 Ant 7: 7 -> 2 -> 11 -> 15 -> 6 -> 17 -> 13 -> 3 -> 4
-> 10 -> 8 -> 14 -> 12 -> 5 -> 9 -> 18 -> 1 -> 16
-> 19 -> 7 | Length = 6702,84
252 Ant 8: 8 -> 16 -> 13 -> 1 -> 6 -> 5 -> 18 -> 19 ->
10 -> 14 -> 15 -> 2 -> 7 -> 9 -> 12 -> 17 -> 11 -> 4
-> 3 -> 8 | Length = 7298,90
253 Ant 9: 9 -> 5 -> 18 -> 17 -> 15 -> 16 -> 4 -> 10 ->
8 -> 2 -> 3 -> 19 -> 6 -> 1 -> 7 -> 14 -> 11 -> 13
-> 12 -> 9 | Length = 6702,53
254 Ant 10: 10 -> 4 -> 7 -> 2 -> 15 -> 17 -> 13 -> 3 ->
16 -> 12 -> 11 -> 14 -> 5 -> 18 -> 1 -> 9 -> 19 -> 8
-> 6 -> 10 | Length = 6582,13
255 Ant 11: 11 -> 9 -> 1 -> 12 -> 6 -> 19 -> 16 -> 5 ->
18 -> 7 -> 4 -> 10 -> 2 -> 8 -> 15 -> 17 -> 13 -> 3
-> 14 -> 11 | Length = 6398,35
256 Ant 12: 12 -> 6 -> 17 -> 19 -> 11 -> 2 -> 15 -> 3
-> 4 -> 8 -> 18 -> 7 -> 16 -> 1 -> 9 -> 13 -> 14
-> 5 -> 10 -> 12 | Length = 6935,27

```

```

257 Ant 13: 13 -> 11 -> 15 -> 9 -> 10 -> 6 -> 14 -> 17
    -> 19 -> 3 -> 7 -> 4 -> 1 -> 16 -> 12 -> 5 -> 8 ->
    2 -> 18 -> 13 | Length = 5473,25
258 Ant 14: 14 -> 1 -> 5 -> 11 -> 7 -> 3 -> 8 -> 13 ->
    17 -> 16 -> 4 -> 9 -> 15 -> 2 -> 6 -> 19 -> 10 -> 12
    -> 18 -> 14 | Length = 6499,70
259 Ant 15: 15 -> 11 -> 14 -> 8 -> 18 -> 6 -> 1 -> 4 ->
    7 -> 3 -> 13 -> 9 -> 12 -> 16 -> 10 -> 19 -> 17 -> 5
    -> 2 -> 15 | Length = 6714,77
260 Ant 16: 16 -> 8 -> 14 -> 15 -> 6 -> 17 -> 18 -> 7
    -> 11 -> 9 -> 1 -> 10 -> 3 -> 13 -> 19 -> 12 -> 5
    -> 4 -> 2 -> 16 | Length = 7278,93
261 Ant 17: 17 -> 13 -> 8 -> 14 -> 7 -> 18 -> 5 -> 4 ->
    10 -> 16 -> 1 -> 9 -> 11 -> 12 -> 15 -> 2 -> 3 -> 19
    -> 6 -> 17 | Length = 6524,89
262 Ant 18: 18 -> 13 -> 3 -> 6 -> 7 -> 15 -> 4 -> 8 ->
    16 -> 2 -> 19 -> 17 -> 11 -> 12 -> 5 -> 10 -> 9 -> 1
    -> 14 -> 18 | Length = 6804,08
263 Ant 19: 19 -> 3 -> 15 -> 13 -> 8 -> 5 -> 6 -> 17 ->
    9 -> 14 -> 18 -> 4 -> 12 -> 1 -> 16 -> 10 -> 7 -> 11
    -> 2 -> 19 | Length = 6138,42
264 Best so far: 5109,45
265
266 ===== Iteration 13 =====
267 Ant 1: 1 -> 6 -> 17 -> 13 -> 3 -> 14 -> 8 -> 18 -> 5
    -> 4 -> 16 -> 19 -> 2 -> 10 -> 9 -> 15 -> 12 -> 11
    -> 7 -> 1 | Length = 7067,50
268 Ant 2: 2 -> 7 -> 6 -> 10 -> 5 -> 3 -> 13 -> 11 -> 17
    -> 14 -> 18 -> 19 -> 9 -> 1 -> 4 -> 12 -> 16 -> 8
    -> 15 -> 2 | Length = 6141,09
269 Ant 3: 3 -> 15 -> 9 -> 18 -> 13 -> 11 -> 2 -> 7 ->
    10 -> 1 -> 6 -> 17 -> 12 -> 14 -> 8 -> 16 -> 4 -> 5
    -> 19 -> 3 | Length = 6462,49
270 Ant 4: 4 -> 18 -> 5 -> 1 -> 9 -> 3 -> 7 -> 14 -> 8
    -> 17 -> 13 -> 6 -> 19 -> 15 -> 2 -> 11 -> 16 -> 12
    -> 10 -> 4 | Length = 6852,79
271 Ant 5: 5 -> 8 -> 13 -> 11 -> 9 -> 3 -> 15 -> 2 -> 6
    -> 1 -> 7 -> 16 -> 12 -> 17 -> 19 -> 18 -> 14 -> 4
    -> 10 -> 5 | Length = 5848,44
272 Ant 6: 6 -> 14 -> 3 -> 7 -> 4 -> 2 -> 18 -> 8 -> 17
    -> 19 -> 9 -> 16 -> 1 -> 10 -> 5 -> 11 -> 15 -> 13

```

```

272  -> 12 -> 6 | Length = 5070,97
273 Ant 7: 7 -> 13 -> 14 -> 3 -> 15 -> 11 -> 19 -> 17
      -> 9 -> 1 -> 16 -> 10 -> 6 -> 2 -> 8 -> 5 -> 18 ->
      12 -> 4 -> 7 | Length = 6315,20
274 Ant 8: 8 -> 16 -> 12 -> 11 -> 13 -> 17 -> 19 -> 18
      -> 7 -> 3 -> 14 -> 9 -> 10 -> 2 -> 4 -> 1 -> 5 -> 6
      -> 15 -> 8 | Length = 6335,87
275 Ant 9: 9 -> 12 -> 4 -> 14 -> 1 -> 16 -> 8 -> 6 -> 7
      -> 11 -> 19 -> 10 -> 2 -> 15 -> 3 -> 13 -> 18 -> 17
      -> 5 -> 9 | Length = 6468,98
276 Ant 10: 10 -> 19 -> 17 -> 6 -> 18 -> 5 -> 11 -> 15
      -> 13 -> 8 -> 14 -> 16 -> 2 -> 4 -> 7 -> 3 -> 12
      -> 1 -> 9 -> 10 | Length = 5906,01
277 Ant 11: 11 -> 2 -> 15 -> 19 -> 17 -> 13 -> 5 -> 18
      -> 7 -> 6 -> 1 -> 14 -> 3 -> 16 -> 10 -> 4 -> 8 ->
      12 -> 9 -> 11 | Length = 5858,16
278 Ant 12: 12 -> 6 -> 19 -> 17 -> 4 -> 7 -> 3 -> 2 ->
      15 -> 11 -> 14 -> 5 -> 8 -> 1 -> 16 -> 10 -> 9 -> 13
      -> 18 -> 12 | Length = 6180,90
279 Ant 13: 13 -> 8 -> 5 -> 17 -> 6 -> 4 -> 16 -> 19 ->
      18 -> 15 -> 12 -> 10 -> 3 -> 7 -> 11 -> 14 -> 1 -> 9
      -> 2 -> 13 | Length = 7128,67
280 Ant 14: 14 -> 17 -> 19 -> 9 -> 10 -> 16 -> 3 -> 13
      -> 8 -> 2 -> 11 -> 5 -> 18 -> 7 -> 1 -> 6 -> 4 ->
      12 -> 15 -> 14 | Length = 6437,19
281 Ant 15: 15 -> 2 -> 16 -> 1 -> 18 -> 19 -> 6 -> 7 ->
      11 -> 5 -> 4 -> 3 -> 10 -> 12 -> 9 -> 14 -> 17 -> 8
      -> 13 -> 15 | Length = 6625,26
282 Ant 16: 16 -> 19 -> 6 -> 17 -> 7 -> 14 -> 12 -> 10
      -> 8 -> 13 -> 2 -> 15 -> 9 -> 5 -> 4 -> 1 -> 18 ->
      3 -> 11 -> 16 | Length = 6442,54
283 Ant 17: 17 -> 15 -> 13 -> 3 -> 8 -> 18 -> 2 -> 10
      -> 19 -> 4 -> 14 -> 12 -> 6 -> 1 -> 16 -> 9 -> 5
      -> 11 -> 7 -> 17 | Length = 5601,77
284 Ant 18: 18 -> 8 -> 16 -> 13 -> 3 -> 1 -> 6 -> 9 ->
      15 -> 7 -> 11 -> 5 -> 10 -> 17 -> 14 -> 19 -> 2 -> 4
      -> 12 -> 18 | Length = 6627,46
285 Ant 19: 19 -> 18 -> 17 -> 5 -> 6 -> 14 -> 1 -> 9 ->
      2 -> 15 -> 7 -> 3 -> 12 -> 10 -> 4 -> 16 -> 8 -> 13
      -> 11 -> 19 | Length = 6525,22
286 Best so far: 5070,97

```

```

287
288 ===== Iteration 14 =====
289 Ant 1: 1 -> 6 -> 12 -> 16 -> 11 -> 13 -> 5 -> 10 ->
   2 -> 7 -> 18 -> 14 -> 3 -> 9 -> 17 -> 8 -> 19 -> 15
   -> 4 -> 1 | Length = 5440,69
290 Ant 2: 2 -> 11 -> 5 -> 9 -> 13 -> 15 -> 16 -> 1 ->
   10 -> 12 -> 6 -> 17 -> 19 -> 18 -> 8 -> 4 -> 7 -> 3
   -> 14 -> 2 | Length = 4956,49
291 Ant 3: 3 -> 15 -> 13 -> 17 -> 11 -> 12 -> 8 -> 19
   -> 10 -> 6 -> 14 -> 1 -> 5 -> 9 -> 16 -> 2 -> 7 ->
   18 -> 4 -> 3 | Length = 5239,48
292 Ant 4: 4 -> 14 -> 13 -> 18 -> 2 -> 16 -> 19 -> 11
   -> 7 -> 10 -> 9 -> 1 -> 6 -> 5 -> 3 -> 15 -> 17 ->
   8 -> 12 -> 4 | Length = 7375,08
293 Ant 5: 5 -> 8 -> 2 -> 11 -> 17 -> 1 -> 4 -> 3 -> 13
   -> 16 -> 10 -> 12 -> 18 -> 7 -> 9 -> 15 -> 6 -> 14
   -> 19 -> 5 | Length = 6530,24
294 Ant 6: 6 -> 7 -> 18 -> 17 -> 19 -> 11 -> 13 -> 14
   -> 15 -> 9 -> 1 -> 16 -> 4 -> 2 -> 10 -> 3 -> 12
   -> 5 -> 8 -> 6 | Length = 5911,47
295 Ant 7: 7 -> 4 -> 5 -> 10 -> 1 -> 16 -> 2 -> 15 -> 12
   -> 14 -> 3 -> 19 -> 17 -> 13 -> 8 -> 18 -> 6 -> 9
   -> 11 -> 7 | Length = 6512,11
296 Ant 8: 8 -> 10 -> 1 -> 18 -> 14 -> 9 -> 17 -> 7 ->
   11 -> 12 -> 6 -> 5 -> 4 -> 2 -> 15 -> 3 -> 13 -> 19
   -> 16 -> 8 | Length = 7162,44
297 Ant 9: 9 -> 10 -> 12 -> 16 -> 13 -> 17 -> 6 -> 4 ->
   2 -> 15 -> 7 -> 3 -> 19 -> 11 -> 14 -> 18 -> 5 -> 8
   -> 1 -> 9 | Length = 7071,10
298 Ant 10: 10 -> 12 -> 9 -> 1 -> 4 -> 18 -> 8 -> 17 ->
   6 -> 19 -> 7 -> 3 -> 14 -> 15 -> 5 -> 11 -> 2 -> 16
   -> 13 -> 10 | Length = 7007,77
299 Ant 11: 11 -> 3 -> 1 -> 12 -> 10 -> 6 -> 5 -> 18 ->
   7 -> 4 -> 13 -> 8 -> 17 -> 14 -> 9 -> 19 -> 15 -> 2
   -> 16 -> 11 | Length = 5939,07
300 Ant 12: 12 -> 17 -> 7 -> 1 -> 9 -> 11 -> 5 -> 3 ->
   15 -> 14 -> 13 -> 8 -> 18 -> 19 -> 16 -> 4 -> 6 -> 2
   -> 10 -> 12 | Length = 7076,53
301 Ant 13: 13 -> 8 -> 16 -> 19 -> 2 -> 15 -> 17 -> 6
   -> 5 -> 14 -> 4 -> 1 -> 9 -> 3 -> 7 -> 11 -> 12 ->
   10 -> 18 -> 13 | Length = 7565,61

```

```

302 Ant 14: 14 -> 18 -> 2 -> 6 -> 17 -> 11 -> 15 -> 8
    -> 5 -> 10 -> 4 -> 19 -> 16 -> 1 -> 9 -> 13 -> 12
    -> 3 -> 7 -> 14 | Length = 5032,18
303 Ant 15: 15 -> 9 -> 19 -> 17 -> 16 -> 8 -> 3 -> 13
    -> 11 -> 5 -> 18 -> 6 -> 1 -> 7 -> 2 -> 10 -> 4 ->
    12 -> 14 -> 15 | Length = 6015,23
304 Ant 16: 16 -> 12 -> 9 -> 13 -> 3 -> 7 -> 11 -> 15
    -> 19 -> 18 -> 8 -> 5 -> 17 -> 6 -> 1 -> 10 -> 2
    -> 4 -> 14 -> 16 | Length = 5942,25
305 Ant 17: 17 -> 15 -> 13 -> 8 -> 16 -> 12 -> 4 -> 7
    -> 11 -> 19 -> 18 -> 14 -> 5 -> 9 -> 1 -> 3 -> 2
    -> 6 -> 10 -> 17 | Length = 5440,77
306 Ant 18: 18 -> 5 -> 9 -> 1 -> 11 -> 12 -> 16 -> 3 ->
    10 -> 6 -> 17 -> 14 -> 19 -> 4 -> 2 -> 15 -> 8 -> 13
    -> 7 -> 18 | Length = 5859,45
307 Ant 19: 19 -> 17 -> 5 -> 8 -> 14 -> 18 -> 12 -> 10
    -> 9 -> 1 -> 6 -> 7 -> 11 -> 15 -> 16 -> 3 -> 2 ->
    4 -> 13 -> 19 | Length = 5754,06
308 Best so far: 4956,49
309
310 ===== Iteration 15 =====
311 Ant 1: 1 -> 14 -> 17 -> 5 -> 12 -> 4 -> 16 -> 15 ->
    11 -> 7 -> 18 -> 13 -> 9 -> 19 -> 3 -> 2 -> 6 -> 10
    -> 8 -> 1 | Length = 6054,94
312 Ant 2: 2 -> 6 -> 13 -> 3 -> 9 -> 14 -> 1 -> 18 -> 5
    -> 17 -> 19 -> 4 -> 7 -> 11 -> 15 -> 16 -> 12 -> 8
    -> 10 -> 2 | Length = 6289,74
313 Ant 3: 3 -> 13 -> 9 -> 18 -> 6 -> 1 -> 7 -> 11 -> 15
    -> 2 -> 19 -> 17 -> 14 -> 12 -> 16 -> 8 -> 4 -> 10
    -> 5 -> 3 | Length = 6569,11
314 Ant 4: 4 -> 1 -> 6 -> 14 -> 18 -> 7 -> 10 -> 5 -> 8
    -> 13 -> 3 -> 2 -> 11 -> 16 -> 15 -> 19 -> 17 -> 9
    -> 12 -> 4 | Length = 5513,43
315 Ant 5: 5 -> 9 -> 13 -> 15 -> 11 -> 17 -> 8 -> 4 -> 6
    -> 16 -> 2 -> 10 -> 18 -> 19 -> 7 -> 3 -> 14 -> 1
    -> 12 -> 5 | Length = 5618,26
316 Ant 6: 6 -> 4 -> 16 -> 19 -> 17 -> 11 -> 13 -> 8 ->
    5 -> 10 -> 2 -> 18 -> 12 -> 14 -> 15 -> 3 -> 7 -> 1
    -> 9 -> 6 | Length = 7023,61
317 Ant 7: 7 -> 17 -> 11 -> 15 -> 13 -> 9 -> 10 -> 18
    -> 19 -> 16 -> 4 -> 3 -> 1 -> 6 -> 2 -> 8 -> 12 ->

```

```

317 5 -> 14 -> 7 | Length = 5984,01
318 Ant 8: 8 -> 18 -> 7 -> 15 -> 3 -> 14 -> 17 -> 6 -> 1
    -> 9 -> 10 -> 2 -> 16 -> 19 -> 12 -> 11 -> 5 -> 4
    -> 13 -> 8 | Length = 6923,56
319 Ant 9: 9 -> 10 -> 1 -> 16 -> 3 -> 2 -> 11 -> 5 -> 6
    -> 4 -> 7 -> 18 -> 8 -> 13 -> 17 -> 19 -> 14 -> 15
    -> 12 -> 9 | Length = 6151,56
320 Ant 10: 10 -> 1 -> 9 -> 2 -> 15 -> 11 -> 19 -> 6 ->
    14 -> 17 -> 13 -> 8 -> 16 -> 12 -> 4 -> 7 -> 18 -> 3
    -> 5 -> 10 | Length = 6336,11
321 Ant 11: 11 -> 12 -> 6 -> 5 -> 1 -> 9 -> 15 -> 17 ->
    8 -> 18 -> 14 -> 13 -> 19 -> 4 -> 16 -> 3 -> 2 -> 7
    -> 10 -> 11 | Length = 6122,72
322 Ant 12: 12 -> 14 -> 19 -> 16 -> 13 -> 3 -> 7 -> 2
    -> 4 -> 6 -> 1 -> 9 -> 15 -> 5 -> 8 -> 17 -> 11 ->
    10 -> 18 -> 12 | Length = 5861,29
323 Ant 13: 13 -> 11 -> 7 -> 14 -> 17 -> 5 -> 18 -> 8
    -> 3 -> 2 -> 16 -> 15 -> 9 -> 1 -> 10 -> 12 -> 4
    -> 6 -> 19 -> 13 | Length = 6339,32
324 Ant 14: 14 -> 17 -> 18 -> 7 -> 4 -> 1 -> 6 -> 12 ->
    8 -> 5 -> 2 -> 3 -> 13 -> 19 -> 10 -> 16 -> 11 -> 15
    -> 9 -> 14 | Length = 5705,05
325 Ant 15: 15 -> 8 -> 13 -> 17 -> 19 -> 9 -> 1 -> 6 ->
    12 -> 10 -> 2 -> 18 -> 4 -> 7 -> 11 -> 14 -> 5 -> 3
    -> 16 -> 15 | Length = 5254,67
326 Ant 16: 16 -> 7 -> 14 -> 18 -> 19 -> 15 -> 3 -> 13
    -> 11 -> 17 -> 5 -> 10 -> 1 -> 4 -> 2 -> 9 -> 12
    -> 6 -> 8 -> 16 | Length = 6537,78
327 Ant 17: 17 -> 19 -> 18 -> 12 -> 5 -> 4 -> 1 -> 9 ->
    16 -> 8 -> 10 -> 3 -> 15 -> 2 -> 11 -> 13 -> 14 -> 7
    -> 6 -> 17 | Length = 6934,60
328 Ant 18: 18 -> 19 -> 5 -> 9 -> 1 -> 16 -> 3 -> 7 ->
    14 -> 11 -> 15 -> 17 -> 8 -> 13 -> 12 -> 4 -> 2 ->
    10 -> 6 -> 18 | Length = 5557,50
329 Ant 19: 19 -> 9 -> 5 -> 18 -> 7 -> 3 -> 10 -> 4 -> 8
    -> 2 -> 16 -> 14 -> 17 -> 6 -> 1 -> 12 -> 11 -> 13
    -> 15 -> 19 | Length = 5847,11
330 Best so far: 4956,49
331
332 ===== Iteration 16 =====
333 Ant 1: 1 -> 10 -> 12 -> 4 -> 7 -> 17 -> 14 -> 6 -> 5

```

|     |  |
|-----|--|
| 333 | -> 18 -> 13 -> 15 -> 8 -> 3 -> 16 -> 2 -> 9 -> 11<br>-> 19 -> 1   Length = 6250,77   |
| 334 | Ant 2: 2 -> 3 -> 7 -> 4 -> 13 -> 6 -> 1 -> 9 -> 10<br>-> 16 -> 19 -> 12 -> 14 -> 17 -> 18 -> 5 -> 8 -> 15<br>-> 11 -> 2   Length = 6476,85   |
| 335 | Ant 3: 3 -> 14 -> 6 -> 4 -> 2 -> 10 -> 5 -> 18 -> 12<br>-> 16 -> 1 -> 9 -> 13 -> 8 -> 19 -> 11 -> 7 -> 15<br>-> 17 -> 3   Length = 5846,92   |
| 336 | Ant 4: 4 -> 8 -> 15 -> 16 -> 9 -> 19 -> 17 -> 2 -> 3<br>-> 10 -> 5 -> 11 -> 12 -> 6 -> 14 -> 13 -> 18 -> 1<br>-> 7 -> 4   Length = 5670,23   |
| 337 | Ant 5: 5 -> 9 -> 19 -> 7 -> 13 -> 18 -> 8 -> 4 -> 12<br>-> 3 -> 15 -> 17 -> 11 -> 2 -> 16 -> 14 -> 6 -> 1<br>-> 10 -> 5   Length = 6076,06   |
| 338 | Ant 6: 6 -> 17 -> 9 -> 1 -> 15 -> 13 -> 3 -> 5 -> 14<br>-> 7 -> 4 -> 12 -> 11 -> 2 -> 19 -> 16 -> 10 -> 8<br>-> 18 -> 6   Length = 6939,74   |
| 339 | Ant 7: 7 -> 11 -> 5 -> 8 -> 15 -> 2 -> 16 -> 3 -> 9<br>-> 1 -> 6 -> 10 -> 12 -> 13 -> 14 -> 19 -> 17 -> 18<br>-> 4 -> 7   Length = 6087,74   |
| 340 | Ant 8: 8 -> 5 -> 14 -> 17 -> 16 -> 18 -> 10 -> 12<br>-> 13 -> 19 -> 6 -> 1 -> 4 -> 7 -> 11 -> 9 -> 2 -><br>15 -> 3 -> 8   Length = 7194,55   |
| 341 | Ant 9: 9 -> 5 -> 17 -> 18 -> 6 -> 14 -> 12 -> 11 -><br>7 -> 4 -> 1 -> 16 -> 8 -> 19 -> 13 -> 3 -> 15 -> 2<br>-> 10 -> 9   Length = 5674,18   |
| 342 | Ant 10: 10 -> 12 -> 16 -> 3 -> 2 -> 11 -> 9 -> 14<br>-> 18 -> 7 -> 4 -> 19 -> 15 -> 13 -> 8 -> 5 -> 17<br>-> 6 -> 1 -> 10   Length = 5113,63 |
| 343 | Ant 11: 11 -> 9 -> 5 -> 10 -> 6 -> 1 -> 14 -> 17 -><br>15 -> 2 -> 3 -> 7 -> 4 -> 16 -> 19 -> 8 -> 13 -> 18<br>-> 12 -> 11   Length = 6313,47 |
| 344 | Ant 12: 12 -> 10 -> 1 -> 6 -> 16 -> 19 -> 18 -> 5<br>-> 11 -> 15 -> 7 -> 4 -> 13 -> 9 -> 14 -> 17 -> 8<br>-> 3 -> 2 -> 12   Length = 6284,07 |
| 345 | Ant 13: 13 -> 7 -> 3 -> 2 -> 11 -> 12 -> 5 -> 9 -><br>14 -> 16 -> 15 -> 19 -> 17 -> 6 -> 18 -> 8 -> 4 -> 1<br>-> 10 -> 13   Length = 6898,21 |
| 346 | Ant 14: 14 -> 13 -> 3 -> 4 -> 9 -> 15 -> 2 -> 6 -><br>19 -> 10 -> 1 -> 5 -> 8 -> 12 -> 16 -> 11 -> 17 -><br>18 -> 7 -> 14   Length = 6026,88 |

```

347 Ant 15: 15 -> 13 -> 8 -> 2 -> 6 -> 14 -> 5 -> 18 ->
    7 -> 3 -> 12 -> 4 -> 16 -> 1 -> 10 -> 11 -> 17 -> 19
    -> 9 -> 15 | Length = 4935,41
348 Ant 16: 16 -> 3 -> 7 -> 1 -> 8 -> 18 -> 12 -> 11 ->
    19 -> 10 -> 2 -> 6 -> 4 -> 13 -> 15 -> 14 -> 17 -> 5
    -> 9 -> 16 | Length = 6375,83
349 Ant 17: 17 -> 19 -> 10 -> 2 -> 13 -> 11 -> 15 -> 16
    -> 4 -> 12 -> 6 -> 1 -> 9 -> 7 -> 3 -> 18 -> 8 -> 5
    -> 14 -> 17 | Length = 6964,01
350 Ant 18: 18 -> 13 -> 11 -> 7 -> 4 -> 1 -> 6 -> 19 ->
    12 -> 16 -> 15 -> 2 -> 10 -> 5 -> 17 -> 9 -> 3 -> 14
    -> 8 -> 18 | Length = 6835,96
351 Ant 19: 19 -> 17 -> 7 -> 18 -> 5 -> 9 -> 16 -> 1 ->
    4 -> 10 -> 2 -> 15 -> 13 -> 11 -> 12 -> 6 -> 14 -> 3
    -> 8 -> 19 | Length = 5450,10
352 Best so far: 4935,41
353
354 ===== Iteration 17 =====
355 Ant 1: 1 -> 6 -> 13 -> 15 -> 16 -> 12 -> 9 -> 17 ->
    5 -> 10 -> 19 -> 7 -> 11 -> 14 -> 3 -> 4 -> 8 -> 18
    -> 2 -> 1 | Length = 6401,77
356 Ant 2: 2 -> 4 -> 1 -> 10 -> 5 -> 8 -> 13 -> 19 -> 15
    -> 3 -> 7 -> 6 -> 17 -> 11 -> 12 -> 16 -> 9 -> 14
    -> 18 -> 2 | Length = 5913,78
357 Ant 3: 3 -> 8 -> 19 -> 18 -> 1 -> 7 -> 2 -> 16 -> 12
    -> 14 -> 13 -> 10 -> 5 -> 9 -> 4 -> 6 -> 17 -> 15
    -> 11 -> 3 | Length = 6168,02
358 Ant 4: 4 -> 6 -> 19 -> 18 -> 5 -> 17 -> 8 -> 13 -> 2
    -> 11 -> 12 -> 16 -> 15 -> 1 -> 9 -> 14 -> 7 -> 10
    -> 3 -> 4 | Length = 6551,26
359 Ant 5: 5 -> 9 -> 13 -> 15 -> 2 -> 6 -> 1 -> 3 -> 7
    -> 18 -> 8 -> 10 -> 4 -> 19 -> 11 -> 14 -> 17 -> 12
    -> 16 -> 5 | Length = 5462,18
360 Ant 6: 6 -> 14 -> 17 -> 15 -> 13 -> 11 -> 7 -> 19
    -> 2 -> 10 -> 1 -> 4 -> 18 -> 8 -> 5 -> 3 -> 16 ->
    9 -> 12 -> 6 | Length = 5941,43
361 Ant 7: 7 -> 11 -> 15 -> 13 -> 3 -> 19 -> 10 -> 2 ->
    6 -> 1 -> 14 -> 9 -> 16 -> 8 -> 5 -> 17 -> 12 -> 18
    -> 4 -> 7 | Length = 5669,86
362 Ant 8: 8 -> 19 -> 10 -> 12 -> 1 -> 7 -> 18 -> 6 ->
    17 -> 14 -> 3 -> 13 -> 9 -> 15 -> 11 -> 2 -> 4 -> 5

```

```

362  -> 16 -> 8 | Length = 5701,51
363 Ant 9: 9 -> 13 -> 4 -> 12 -> 2 -> 16 -> 1 -> 10 -> 6
      -> 14 -> 7 -> 3 -> 8 -> 5 -> 17 -> 11 -> 19 -> 15
      -> 18 -> 9 | Length = 5609,56
364 Ant 10: 10 -> 1 -> 9 -> 11 -> 17 -> 13 -> 8 -> 18
      -> 14 -> 3 -> 2 -> 15 -> 19 -> 6 -> 4 -> 7 -> 16
      -> 12 -> 5 -> 10 | Length = 6499,50
365 Ant 11: 11 -> 16 -> 12 -> 4 -> 1 -> 6 -> 2 -> 15 ->
      13 -> 17 -> 19 -> 18 -> 5 -> 9 -> 10 -> 3 -> 7 -> 14
      -> 8 -> 11 | Length = 5631,74
366 Ant 12: 12 -> 2 -> 6 -> 4 -> 10 -> 19 -> 17 -> 5 ->
      11 -> 15 -> 8 -> 16 -> 1 -> 18 -> 14 -> 7 -> 3 -> 13
      -> 9 -> 12 | Length = 5289,81
367 Ant 13: 13 -> 11 -> 9 -> 19 -> 10 -> 1 -> 4 -> 18
      -> 17 -> 14 -> 6 -> 12 -> 5 -> 8 -> 3 -> 2 -> 15
      -> 16 -> 7 -> 13 | Length = 5988,17
368 Ant 14: 14 -> 17 -> 19 -> 8 -> 6 -> 12 -> 18 -> 5
      -> 3 -> 9 -> 10 -> 1 -> 16 -> 2 -> 15 -> 13 -> 4
      -> 7 -> 11 -> 14 | Length = 6705,63
369 Ant 15: 15 -> 16 -> 13 -> 12 -> 10 -> 2 -> 8 -> 3
      -> 7 -> 14 -> 9 -> 1 -> 6 -> 4 -> 19 -> 11 -> 17
      -> 18 -> 5 -> 15 | Length = 6457,23
370 Ant 16: 16 -> 1 -> 10 -> 5 -> 18 -> 12 -> 14 -> 3
      -> 4 -> 13 -> 15 -> 7 -> 11 -> 19 -> 17 -> 9 -> 2
      -> 8 -> 6 -> 16 | Length = 6896,81
371 Ant 17: 17 -> 9 -> 13 -> 4 -> 10 -> 2 -> 19 -> 12
      -> 6 -> 14 -> 15 -> 16 -> 18 -> 8 -> 5 -> 11 -> 7
      -> 3 -> 1 -> 17 | Length = 6261,56
372 Ant 18: 18 -> 13 -> 15 -> 5 -> 9 -> 1 -> 6 -> 12 ->
      16 -> 3 -> 2 -> 8 -> 4 -> 19 -> 17 -> 14 -> 11 -> 7
      -> 10 -> 18 | Length = 5961,25
373 Ant 19: 19 -> 16 -> 10 -> 12 -> 3 -> 15 -> 2 -> 18
      -> 5 -> 11 -> 17 -> 8 -> 13 -> 14 -> 6 -> 1 -> 4
      -> 7 -> 9 -> 19 | Length = 5962,96
374 Best so far: 4935,41
375
376 ===== Iteration 18 =====
377 Ant 1: 1 -> 6 -> 2 -> 10 -> 7 -> 15 -> 11 -> 5 -> 16
      -> 12 -> 4 -> 19 -> 17 -> 9 -> 14 -> 3 -> 8 -> 18
      -> 13 -> 1 | Length = 6482,34
378 Ant 2: 2 -> 6 -> 1 -> 13 -> 8 -> 19 -> 15 -> 5 -> 9

```

|     |  |
|-----|--|
| 378 | -> 16 -> 12 -> 18 -> 7 -> 4 -> 3 -> 14 -> 11 -> 10<br>-> 17 -> 2   Length = 5204,70  |
| 379 | Ant 3: 3 -> 16 -> 2 -> 15 -> 7 -> 11 -> 5 -> 8 -> 18<br>-> 14 -> 6 -> 4 -> 10 -> 17 -> 19 -> 9 -> 1 -> 12<br>-> 13 -> 3   Length = 6245,25   |
| 380 | Ant 4: 4 -> 19 -> 6 -> 17 -> 9 -> 18 -> 5 -> 10 -> 1<br>-> 16 -> 2 -> 15 -> 14 -> 12 -> 11 -> 7 -> 3 -> 8<br>-> 13 -> 4   Length = 6816,98   |
| 381 | Ant 5: 5 -> 17 -> 9 -> 1 -> 18 -> 19 -> 11 -> 15 -><br>13 -> 8 -> 3 -> 7 -> 4 -> 12 -> 16 -> 2 -> 6 -> 10<br>-> 14 -> 5   Length = 6132,23   |
| 382 | Ant 6: 6 -> 10 -> 12 -> 19 -> 17 -> 11 -> 7 -> 3 -><br>8 -> 18 -> 5 -> 14 -> 9 -> 13 -> 15 -> 16 -> 1 -> 4<br>-> 2 -> 6   Length = 6182,67   |
| 383 | Ant 7: 7 -> 9 -> 1 -> 5 -> 10 -> 4 -> 16 -> 18 -> 13<br>-> 15 -> 17 -> 19 -> 8 -> 3 -> 2 -> 11 -> 12 -> 14<br>-> 6 -> 7   Length = 6579,74   |
| 384 | Ant 8: 8 -> 4 -> 2 -> 11 -> 9 -> 5 -> 12 -> 18 -> 13<br>-> 3 -> 15 -> 17 -> 7 -> 10 -> 1 -> 14 -> 6 -> 19<br>-> 16 -> 8   Length = 6576,65   |
| 385 | Ant 9: 9 -> 13 -> 7 -> 2 -> 15 -> 11 -> 12 -> 16 -><br>3 -> 8 -> 19 -> 10 -> 5 -> 4 -> 1 -> 18 -> 6 -> 14<br>-> 17 -> 9   Length = 5940,42   |
| 386 | Ant 10: 10 -> 1 -> 9 -> 2 -> 8 -> 13 -> 16 -> 3 -> 7<br>-> 11 -> 19 -> 6 -> 18 -> 12 -> 17 -> 14 -> 5 -> 15<br>-> 4 -> 10   Length = 7359,57 |
| 387 | Ant 11: 11 -> 10 -> 3 -> 13 -> 8 -> 5 -> 17 -> 18<br>-> 12 -> 4 -> 1 -> 9 -> 14 -> 6 -> 19 -> 15 -> 2<br>-> 16 -> 7 -> 11   Length = 6950,34 |
| 388 | Ant 12: 12 -> 17 -> 14 -> 13 -> 11 -> 15 -> 2 -> 7<br>-> 10 -> 5 -> 18 -> 4 -> 6 -> 8 -> 19 -> 16 -> 1<br>-> 9 -> 3 -> 12   Length = 6401,01 |
| 389 | Ant 13: 13 -> 4 -> 18 -> 8 -> 17 -> 11 -> 15 -> 3<br>-> 2 -> 16 -> 12 -> 1 -> 7 -> 14 -> 9 -> 19 -> 10<br>-> 6 -> 5 -> 13   Length = 5902,26 |
| 390 | Ant 14: 14 -> 6 -> 13 -> 8 -> 4 -> 2 -> 11 -> 12 -><br>1 -> 7 -> 10 -> 5 -> 18 -> 16 -> 3 -> 19 -> 17 -> 15<br>-> 9 -> 14   Length = 6124,85 |
| 391 | Ant 15: 15 -> 11 -> 12 -> 6 -> 2 -> 3 -> 16 -> 7 -><br>4 -> 10 -> 1 -> 8 -> 13 -> 14 -> 17 -> 9 -> 5 -> 18<br>-> 19 -> 15   Length = 5613,37 |

```

392 Ant 16: 16 -> 10 -> 12 -> 4 -> 7 -> 18 -> 5 -> 17
    -> 13 -> 3 -> 8 -> 15 -> 2 -> 9 -> 11 -> 14 -> 6
    -> 1 -> 19 -> 16 | Length = 6277,57
393 Ant 17: 17 -> 6 -> 14 -> 15 -> 13 -> 19 -> 10 -> 1
    -> 3 -> 16 -> 12 -> 11 -> 5 -> 18 -> 8 -> 2 -> 9
    -> 4 -> 7 -> 17 | Length = 5923,54
394 Ant 18: 18 -> 1 -> 6 -> 16 -> 9 -> 14 -> 17 -> 19
    -> 8 -> 3 -> 12 -> 10 -> 11 -> 13 -> 15 -> 5 -> 4
    -> 7 -> 2 -> 18 | Length = 5483,24
395 Ant 19: 19 -> 17 -> 12 -> 11 -> 9 -> 13 -> 8 -> 6
    -> 2 -> 4 -> 5 -> 14 -> 7 -> 3 -> 18 -> 10 -> 16
    -> 1 -> 15 -> 19 | Length = 5689,16
396 Best so far: 4935,41
397
398 ===== Iteration 19 =====
399 Ant 1: 1 -> 10 -> 16 -> 12 -> 4 -> 2 -> 15 -> 11 ->
    9 -> 5 -> 17 -> 13 -> 18 -> 14 -> 6 -> 8 -> 3 -> 7
    -> 19 -> 1 | Length = 6242,79
400 Ant 2: 2 -> 10 -> 12 -> 1 -> 6 -> 14 -> 17 -> 7 ->
    11 -> 13 -> 16 -> 3 -> 18 -> 5 -> 8 -> 4 -> 19 -> 9
    -> 15 -> 2 | Length = 5536,16
401 Ant 3: 3 -> 2 -> 6 -> 17 -> 14 -> 13 -> 9 -> 1 -> 4
    -> 12 -> 16 -> 7 -> 19 -> 8 -> 5 -> 10 -> 18 -> 15
    -> 11 -> 3 | Length = 6459,06
402 Ant 4: 4 -> 19 -> 10 -> 3 -> 2 -> 6 -> 12 -> 14 -> 9
    -> 17 -> 5 -> 11 -> 7 -> 18 -> 16 -> 8 -> 1 -> 13
    -> 15 -> 4 | Length = 6224,56
403 Ant 5: 5 -> 9 -> 18 -> 6 -> 1 -> 10 -> 16 -> 19 ->
    11 -> 17 -> 7 -> 2 -> 8 -> 13 -> 15 -> 14 -> 3 -> 12
    -> 4 -> 5 | Length = 6086,99
404 Ant 6: 6 -> 1 -> 9 -> 17 -> 10 -> 19 -> 15 -> 11 ->
    14 -> 3 -> 13 -> 5 -> 18 -> 8 -> 2 -> 16 -> 12 -> 4
    -> 7 -> 6 | Length = 6168,83
405 Ant 7: 7 -> 18 -> 10 -> 11 -> 5 -> 17 -> 6 -> 12 ->
    16 -> 1 -> 13 -> 15 -> 19 -> 8 -> 3 -> 2 -> 4 -> 9
    -> 14 -> 7 | Length = 5508,27
406 Ant 8: 8 -> 6 -> 18 -> 5 -> 12 -> 10 -> 19 -> 3 -> 1
    -> 4 -> 16 -> 15 -> 13 -> 9 -> 11 -> 2 -> 17 -> 7
    -> 14 -> 8 | Length = 6501,96
407 Ant 9: 9 -> 17 -> 19 -> 11 -> 13 -> 8 -> 2 -> 4 -> 1
    -> 12 -> 18 -> 5 -> 10 -> 6 -> 7 -> 3 -> 15 -> 16

```

```

407  -> 14 -> 9 | Length = 6484,05
408 Ant 10: 10 -> 19 -> 6 -> 14 -> 17 -> 11 -> 7 -> 18
      -> 12 -> 9 -> 4 -> 2 -> 15 -> 13 -> 3 -> 8 -> 16
      -> 1 -> 5 -> 10 | Length = 6312,51
409 Ant 11: 11 -> 2 -> 15 -> 5 -> 10 -> 6 -> 7 -> 19 ->
      16 -> 3 -> 9 -> 14 -> 17 -> 18 -> 13 -> 4 -> 1 -> 12
      -> 8 -> 11 | Length = 6791,16
410 Ant 12: 12 -> 1 -> 3 -> 13 -> 8 -> 4 -> 7 -> 15 ->
      11 -> 14 -> 17 -> 18 -> 19 -> 16 -> 2 -> 9 -> 5 ->
      10 -> 6 -> 12 | Length = 6187,93
411 Ant 13: 13 -> 15 -> 7 -> 18 -> 19 -> 17 -> 6 -> 14
      -> 10 -> 12 -> 16 -> 2 -> 9 -> 1 -> 4 -> 8 -> 3 ->
      5 -> 11 -> 13 | Length = 6392,87
412 Ant 14: 14 -> 9 -> 1 -> 10 -> 4 -> 2 -> 19 -> 17 ->
      11 -> 5 -> 18 -> 13 -> 12 -> 3 -> 8 -> 16 -> 15 -> 7
      -> 6 -> 14 | Length = 6263,81
413 Ant 15: 15 -> 13 -> 4 -> 6 -> 12 -> 16 -> 2 -> 10
      -> 9 -> 1 -> 18 -> 8 -> 19 -> 17 -> 5 -> 3 -> 7 ->
      11 -> 14 -> 15 | Length = 7023,02
414 Ant 16: 16 -> 8 -> 14 -> 15 -> 17 -> 11 -> 12 -> 4
      -> 1 -> 19 -> 9 -> 2 -> 10 -> 5 -> 13 -> 6 -> 18
      -> 7 -> 3 -> 16 | Length = 6812,78
415 Ant 17: 17 -> 13 -> 8 -> 15 -> 14 -> 3 -> 12 -> 10
      -> 4 -> 1 -> 16 -> 18 -> 5 -> 9 -> 19 -> 6 -> 7 ->
      11 -> 2 -> 17 | Length = 5914,35
416 Ant 18: 18 -> 6 -> 5 -> 15 -> 7 -> 1 -> 10 -> 17 ->
      11 -> 9 -> 14 -> 3 -> 8 -> 2 -> 4 -> 13 -> 16 -> 19
      -> 12 -> 18 | Length = 7311,26
417 Ant 19: 19 -> 17 -> 9 -> 11 -> 16 -> 3 -> 7 -> 10
      -> 5 -> 15 -> 8 -> 13 -> 6 -> 4 -> 2 -> 18 -> 12
      -> 14 -> 1 -> 19 | Length = 5691,31
418 Best so far: 4935,41
419
420 ===== Iteration 20 =====
421 Ant 1: 1 -> 6 -> 19 -> 11 -> 7 -> 3 -> 15 -> 8 -> 17
      -> 13 -> 18 -> 16 -> 12 -> 4 -> 10 -> 2 -> 9 -> 5
      -> 14 -> 1 | Length = 6660,64
422 Ant 2: 2 -> 3 -> 8 -> 13 -> 17 -> 18 -> 4 -> 7 -> 11
      -> 19 -> 10 -> 1 -> 16 -> 15 -> 5 -> 12 -> 6 -> 14
      -> 9 -> 2 | Length = 5374,24
423 Ant 3: 3 -> 16 -> 7 -> 10 -> 5 -> 8 -> 1 -> 12 -> 9

```

|     |  |
|-----|--|
| 423 | -> 17 -> 11 -> 15 -> 14 -> 6 -> 13 -> 4 -> 19 -> 18<br>-> 2 -> 3   Length = 5952,96  |
| 424 | Ant 4: 4 -> 12 -> 3 -> 2 -> 16 -> 8 -> 15 -> 11 -><br>17 -> 6 -> 13 -> 18 -> 7 -> 14 -> 5 -> 10 -> 19 -> 1<br>-> 9 -> 4   Length = 6446,18   |
| 425 | Ant 5: 5 -> 18 -> 1 -> 16 -> 2 -> 10 -> 3 -> 14 -> 6<br>-> 7 -> 19 -> 15 -> 13 -> 17 -> 11 -> 9 -> 4 -> 8<br>-> 12 -> 5   Length = 5832,50   |
| 426 | Ant 6: 6 -> 1 -> 13 -> 8 -> 12 -> 10 -> 5 -> 18 -><br>19 -> 17 -> 14 -> 7 -> 3 -> 9 -> 15 -> 16 -> 2 -> 4<br>-> 11 -> 6   Length = 5848,36   |
| 427 | Ant 7: 7 -> 18 -> 6 -> 16 -> 2 -> 9 -> 19 -> 8 -> 4<br>-> 12 -> 14 -> 17 -> 11 -> 15 -> 13 -> 1 -> 10 -> 5<br>-> 3 -> 7   Length = 6509,90   |
| 428 | Ant 8: 8 -> 3 -> 2 -> 16 -> 10 -> 4 -> 1 -> 13 -> 18<br>-> 12 -> 9 -> 5 -> 17 -> 7 -> 11 -> 19 -> 15 -> 14<br>-> 6 -> 8   Length = 6989,43   |
| 429 | Ant 9: 9 -> 2 -> 3 -> 7 -> 17 -> 19 -> 4 -> 15 -> 8<br>-> 16 -> 1 -> 10 -> 5 -> 11 -> 12 -> 18 -> 14 -> 13<br>-> 6 -> 9   Length = 6516,54   |
| 430 | Ant 10: 10 -> 19 -> 16 -> 15 -> 11 -> 13 -> 3 -> 1<br>-> 14 -> 8 -> 6 -> 7 -> 4 -> 12 -> 9 -> 17 -> 2 -><br>18 -> 5 -> 10   Length = 6332,64 |
| 431 | Ant 11: 11 -> 5 -> 17 -> 18 -> 7 -> 15 -> 13 -> 4<br>-> 6 -> 19 -> 8 -> 10 -> 12 -> 1 -> 3 -> 2 -> 16<br>-> 9 -> 14 -> 11   Length = 6234,44 |
| 432 | Ant 12: 12 -> 14 -> 17 -> 15 -> 19 -> 9 -> 5 -> 4<br>-> 7 -> 18 -> 8 -> 16 -> 3 -> 2 -> 11 -> 10 -> 1<br>-> 6 -> 13 -> 12   Length = 5738,87 |
| 433 | Ant 13: 13 -> 18 -> 1 -> 4 -> 10 -> 12 -> 16 -> 15<br>-> 14 -> 5 -> 9 -> 2 -> 19 -> 8 -> 3 -> 7 -> 6 -><br>17 -> 11 -> 13   Length = 6861,80 |
| 434 | Ant 14: 14 -> 1 -> 12 -> 11 -> 15 -> 7 -> 6 -> 8 -><br>18 -> 9 -> 5 -> 17 -> 10 -> 4 -> 2 -> 3 -> 16 -> 13<br>-> 19 -> 14   Length = 5885,84 |
| 435 | Ant 15: 15 -> 2 -> 18 -> 16 -> 12 -> 4 -> 7 -> 3 -><br>11 -> 17 -> 19 -> 8 -> 14 -> 5 -> 10 -> 9 -> 13 -> 1<br>-> 6 -> 15   Length = 6691,06 |
| 436 | Ant 16: 16 -> 3 -> 4 -> 1 -> 9 -> 15 -> 19 -> 12 -><br>11 -> 13 -> 17 -> 5 -> 10 -> 2 -> 7 -> 6 -> 18 -> 14<br>-> 8 -> 16   Length = 5924,64 |

```

437 Ant 17: 17 -> 2 -> 9 -> 19 -> 10 -> 1 -> 3 -> 7 ->
    11 -> 12 -> 18 -> 13 -> 15 -> 14 -> 5 -> 4 -> 6 -> 8
    -> 16 -> 17 | Length = 7045,03
438 Ant 18: 18 -> 8 -> 5 -> 4 -> 2 -> 15 -> 11 -> 9 ->
    10 -> 13 -> 1 -> 6 -> 12 -> 16 -> 3 -> 7 -> 19 -> 17
    -> 14 -> 18 | Length = 6049,11
439 Ant 19: 19 -> 8 -> 13 -> 9 -> 3 -> 14 -> 17 -> 6 ->
    10 -> 1 -> 4 -> 2 -> 11 -> 12 -> 18 -> 5 -> 15 -> 7
    -> 16 -> 19 | Length = 6829,95
440 Best so far: 4935,41
441
442 ===== Iteration 21 =====
443 Ant 1: 1 -> 18 -> 12 -> 11 -> 13 -> 17 -> 15 -> 19
    -> 6 -> 2 -> 10 -> 4 -> 3 -> 14 -> 5 -> 8 -> 16 ->
    7 -> 9 -> 1 | Length = 6859,53
444 Ant 2: 2 -> 16 -> 8 -> 12 -> 11 -> 17 -> 5 -> 18 ->
    14 -> 7 -> 3 -> 19 -> 4 -> 13 -> 1 -> 6 -> 10 -> 9
    -> 15 -> 2 | Length = 6201,99
445 Ant 3: 3 -> 16 -> 12 -> 10 -> 19 -> 6 -> 14 -> 18
    -> 7 -> 15 -> 8 -> 4 -> 2 -> 17 -> 13 -> 1 -> 9 ->
    11 -> 5 -> 3 | Length = 5935,51
446 Ant 4: 4 -> 2 -> 16 -> 3 -> 14 -> 10 -> 1 -> 12 ->
    11 -> 5 -> 18 -> 7 -> 19 -> 17 -> 9 -> 13 -> 8 -> 15
    -> 6 -> 4 | Length = 5354,16
447 Ant 5: 5 -> 14 -> 8 -> 3 -> 15 -> 16 -> 1 -> 12 -> 4
    -> 2 -> 10 -> 17 -> 9 -> 19 -> 18 -> 13 -> 6 -> 7
    -> 11 -> 5 | Length = 6098,17
448 Ant 6: 6 -> 19 -> 2 -> 4 -> 12 -> 10 -> 9 -> 13 ->
    18 -> 8 -> 16 -> 7 -> 3 -> 1 -> 14 -> 17 -> 11 -> 15
    -> 5 -> 6 | Length = 6352,52
449 Ant 7: 7 -> 14 -> 6 -> 8 -> 15 -> 2 -> 10 -> 5 -> 3
    -> 16 -> 12 -> 4 -> 13 -> 11 -> 17 -> 19 -> 1 -> 9
    -> 18 -> 7 | Length = 6044,41
450 Ant 8: 8 -> 13 -> 11 -> 12 -> 4 -> 7 -> 6 -> 17 ->
    19 -> 15 -> 2 -> 10 -> 5 -> 18 -> 16 -> 3 -> 14 -> 9
    -> 1 -> 8 | Length = 6563,24
451 Ant 9: 9 -> 1 -> 16 -> 11 -> 7 -> 15 -> 5 -> 6 -> 13
    -> 18 -> 12 -> 4 -> 8 -> 2 -> 3 -> 14 -> 17 -> 19
    -> 10 -> 9 | Length = 7129,07
452 Ant 10: 10 -> 19 -> 17 -> 14 -> 13 -> 12 -> 5 -> 18
    -> 6 -> 7 -> 4 -> 3 -> 9 -> 1 -> 8 -> 15 -> 2 -> 16

```

```

452  -> 11 -> 10 | Length = 6860,19
453 Ant 11: 11 -> 17 -> 5 -> 6 -> 18 -> 7 -> 15 -> 13
      -> 10 -> 1 -> 4 -> 12 -> 9 -> 3 -> 16 -> 8 -> 2 ->
      19 -> 14 -> 11 | Length = 7014,13
454 Ant 12: 12 -> 4 -> 9 -> 11 -> 5 -> 10 -> 1 -> 13 ->
      15 -> 8 -> 6 -> 7 -> 3 -> 16 -> 18 -> 19 -> 17 -> 14
      -> 2 -> 12 | Length = 5908,74
455 Ant 13: 13 -> 5 -> 18 -> 2 -> 11 -> 17 -> 6 -> 8 ->
      16 -> 19 -> 12 -> 4 -> 1 -> 9 -> 10 -> 7 -> 3 -> 15
      -> 14 -> 13 | Length = 7644,20
456 Ant 14: 14 -> 3 -> 8 -> 1 -> 12 -> 16 -> 9 -> 4 ->
      10 -> 19 -> 13 -> 6 -> 18 -> 7 -> 15 -> 11 -> 17 ->
      5 -> 2 -> 14 | Length = 6092,69
457 Ant 15: 15 -> 7 -> 3 -> 12 -> 11 -> 9 -> 17 -> 2 ->
      16 -> 18 -> 1 -> 4 -> 19 -> 13 -> 8 -> 6 -> 14 -> 5
      -> 10 -> 15 | Length = 6548,69
458 Ant 16: 16 -> 9 -> 10 -> 12 -> 6 -> 4 -> 5 -> 17 ->
      19 -> 7 -> 1 -> 13 -> 11 -> 8 -> 3 -> 2 -> 15 -> 14
      -> 18 -> 16 | Length = 6918,83
459 Ant 17: 17 -> 6 -> 14 -> 5 -> 9 -> 1 -> 13 -> 19 ->
      2 -> 15 -> 11 -> 12 -> 16 -> 3 -> 4 -> 7 -> 18 -> 8
      -> 10 -> 17 | Length = 5905,53
460 Ant 18: 18 -> 12 -> 10 -> 7 -> 15 -> 14 -> 5 -> 9
      -> 13 -> 4 -> 1 -> 19 -> 6 -> 17 -> 16 -> 3 -> 8
      -> 2 -> 11 -> 18 | Length = 7537,27
461 Ant 19: 19 -> 16 -> 2 -> 4 -> 1 -> 10 -> 8 -> 15 ->
      14 -> 11 -> 5 -> 17 -> 7 -> 18 -> 12 -> 9 -> 3 -> 13
      -> 6 -> 19 | Length = 7227,12
462 Best so far: 4935,41
463
464 ===== Iteration 22 =====
465 Ant 1: 1 -> 9 -> 13 -> 15 -> 14 -> 2 -> 16 -> 3 -> 8
      -> 18 -> 19 -> 4 -> 7 -> 6 -> 10 -> 5 -> 17 -> 11
      -> 12 -> 1 | Length = 5334,33
466 Ant 2: 2 -> 3 -> 4 -> 19 -> 10 -> 18 -> 16 -> 9 -> 1
      -> 13 -> 8 -> 12 -> 11 -> 17 -> 14 -> 5 -> 6 -> 7
      -> 15 -> 2 | Length = 7437,83
467 Ant 3: 3 -> 8 -> 15 -> 2 -> 10 -> 5 -> 14 -> 13 ->
      11 -> 7 -> 4 -> 12 -> 1 -> 6 -> 19 -> 16 -> 18 -> 9
      -> 17 -> 3 | Length = 7004,80
468 Ant 4: 4 -> 3 -> 5 -> 10 -> 15 -> 2 -> 9 -> 1 -> 8

```

|     |  |
|-----|--|
| 468 | -> 18 -> 17 -> 7 -> 6 -> 19 -> 14 -> 11 -> 13 -> 16<br>-> 12 -> 4   Length = 7534,03   |
| 469 | Ant 5: 5 -> 10 -> 8 -> 15 -> 14 -> 6 -> 17 -> 2 -> 4<br>-> 12 -> 16 -> 1 -> 18 -> 13 -> 19 -> 3 -> 7 -> 9<br>-> 11 -> 5   Length = 6054,40   |
| 470 | Ant 6: 6 -> 13 -> 4 -> 10 -> 12 -> 18 -> 7 -> 14 -><br>3 -> 16 -> 8 -> 19 -> 17 -> 9 -> 11 -> 15 -> 2 -> 5<br>-> 1 -> 6   Length = 6164,28   |
| 471 | Ant 7: 7 -> 3 -> 16 -> 15 -> 2 -> 4 -> 1 -> 13 -> 17<br>-> 11 -> 12 -> 10 -> 5 -> 8 -> 19 -> 9 -> 14 -> 6<br>-> 18 -> 7   Length = 5729,47   |
| 472 | Ant 8: 8 -> 3 -> 16 -> 12 -> 4 -> 10 -> 17 -> 14 -><br>6 -> 13 -> 18 -> 2 -> 11 -> 5 -> 15 -> 7 -> 19 -> 9<br>-> 1 -> 8   Length = 6211,48   |
| 473 | Ant 9: 9 -> 10 -> 12 -> 18 -> 5 -> 11 -> 13 -> 1 -><br>8 -> 19 -> 6 -> 17 -> 2 -> 15 -> 7 -> 3 -> 4 -> 16<br>-> 14 -> 9   Length = 7864,29   |
| 474 | Ant 10: 10 -> 16 -> 19 -> 8 -> 3 -> 13 -> 15 -> 5<br>-> 14 -> 7 -> 18 -> 6 -> 1 -> 4 -> 2 -> 9 -> 17 -><br>11 -> 12 -> 10   Length = 6070,27 |
| 475 | Ant 11: 11 -> 5 -> 6 -> 12 -> 13 -> 9 -> 17 -> 14<br>-> 3 -> 7 -> 1 -> 16 -> 2 -> 10 -> 4 -> 15 -> 19<br>-> 8 -> 18 -> 11   Length = 6491,41 |
| 476 | Ant 12: 12 -> 11 -> 13 -> 9 -> 4 -> 7 -> 6 -> 14 -><br>3 -> 2 -> 15 -> 16 -> 18 -> 19 -> 8 -> 10 -> 1 -> 5<br>-> 17 -> 12   Length = 5704,18 |
| 477 | Ant 13: 13 -> 15 -> 6 -> 18 -> 19 -> 8 -> 10 -> 4<br>-> 2 -> 3 -> 14 -> 17 -> 5 -> 9 -> 12 -> 11 -> 7<br>-> 16 -> 1 -> 13   Length = 6149,08 |
| 478 | Ant 14: 14 -> 6 -> 7 -> 15 -> 19 -> 8 -> 16 -> 3 -><br>4 -> 5 -> 18 -> 13 -> 11 -> 12 -> 10 -> 1 -> 9 -> 2<br>-> 17 -> 14   Length = 6451,80 |
| 479 | Ant 15: 15 -> 7 -> 3 -> 16 -> 2 -> 4 -> 12 -> 18 -><br>1 -> 14 -> 11 -> 17 -> 9 -> 5 -> 10 -> 19 -> 6 -> 13<br>-> 8 -> 15   Length = 6443,05 |
| 480 | Ant 16: 16 -> 9 -> 3 -> 7 -> 18 -> 5 -> 10 -> 19 -><br>13 -> 1 -> 6 -> 8 -> 15 -> 2 -> 17 -> 14 -> 11 -> 12<br>-> 4 -> 16   Length = 6897,97 |
| 481 | Ant 17: 17 -> 14 -> 15 -> 5 -> 4 -> 19 -> 6 -> 13<br>-> 11 -> 12 -> 18 -> 7 -> 1 -> 16 -> 8 -> 10 -> 9<br>-> 2 -> 3 -> 17   Length = 6525,03 |

```

482 Ant 18: 18 -> 2 -> 16 -> 15 -> 17 -> 10 -> 19 -> 9
    -> 1 -> 8 -> 3 -> 7 -> 11 -> 12 -> 6 -> 14 -> 13
    -> 4 -> 5 -> 18 | Length = 6376,32
483 Ant 19: 19 -> 17 -> 14 -> 5 -> 6 -> 2 -> 3 -> 13 ->
    4 -> 8 -> 15 -> 16 -> 1 -> 7 -> 18 -> 11 -> 9 -> 12
    -> 10 -> 19 | Length = 6119,07
484 Best so far: 4935,41
485
486 ===== Iteration 23 =====
487 Ant 1: 1 -> 4 -> 8 -> 15 -> 14 -> 2 -> 19 -> 13 ->
    12 -> 11 -> 7 -> 18 -> 6 -> 5 -> 9 -> 10 -> 16 -> 3
    -> 17 -> 1 | Length = 6222,03
488 Ant 2: 2 -> 18 -> 7 -> 11 -> 13 -> 15 -> 6 -> 1 -> 8
    -> 5 -> 12 -> 16 -> 4 -> 10 -> 19 -> 17 -> 9 -> 14
    -> 3 -> 2 | Length = 6246,21
489 Ant 3: 3 -> 16 -> 1 -> 6 -> 7 -> 17 -> 5 -> 10 -> 19
    -> 4 -> 12 -> 11 -> 18 -> 9 -> 2 -> 15 -> 13 -> 14
    -> 8 -> 3 | Length = 6325,83
490 Ant 4: 4 -> 7 -> 3 -> 8 -> 10 -> 5 -> 6 -> 14 -> 15
    -> 11 -> 9 -> 16 -> 2 -> 17 -> 13 -> 18 -> 12 -> 1
    -> 19 -> 4 | Length = 6396,38
491 Ant 5: 5 -> 18 -> 12 -> 1 -> 9 -> 2 -> 4 -> 13 -> 15
    -> 7 -> 6 -> 19 -> 17 -> 14 -> 8 -> 3 -> 16 -> 11
    -> 10 -> 5 | Length = 6598,48
492 Ant 6: 6 -> 17 -> 7 -> 18 -> 13 -> 9 -> 12 -> 8 -> 3
    -> 2 -> 16 -> 1 -> 4 -> 10 -> 19 -> 15 -> 11 -> 5
    -> 14 -> 6 | Length = 5927,20
493 Ant 7: 7 -> 3 -> 16 -> 9 -> 10 -> 1 -> 18 -> 12 ->
    11 -> 5 -> 17 -> 14 -> 6 -> 4 -> 2 -> 15 -> 19 -> 8
    -> 13 -> 7 | Length = 6166,25
494 Ant 8: 8 -> 15 -> 2 -> 4 -> 19 -> 17 -> 9 -> 5 -> 11
    -> 12 -> 10 -> 1 -> 13 -> 6 -> 7 -> 18 -> 16 -> 3
    -> 14 -> 8 | Length = 5944,76
495 Ant 9: 9 -> 14 -> 17 -> 2 -> 4 -> 5 -> 10 -> 8 -> 19
    -> 18 -> 13 -> 11 -> 12 -> 6 -> 1 -> 7 -> 3 -> 16
    -> 15 -> 9 | Length = 5731,85
496 Ant 10: 10 -> 5 -> 18 -> 19 -> 4 -> 11 -> 12 -> 16
    -> 9 -> 17 -> 14 -> 1 -> 6 -> 7 -> 15 -> 8 -> 13
    -> 3 -> 2 -> 10 | Length = 5774,13
497 Ant 11: 11 -> 12 -> 18 -> 7 -> 3 -> 16 -> 8 -> 10
    -> 17 -> 14 -> 1 -> 9 -> 13 -> 6 -> 2 -> 15 -> 5

```

```

497  -> 4 -> 19 -> 11 | Length = 5864,71
498 Ant 12: 12 -> 9 -> 19 -> 3 -> 5 -> 17 -> 7 -> 15 ->
    8 -> 13 -> 18 -> 1 -> 10 -> 4 -> 16 -> 2 -> 14 -> 6
    -> 11 -> 12 | Length = 6245,17
499 Ant 13: 13 -> 3 -> 16 -> 9 -> 1 -> 5 -> 6 -> 8 -> 10
    -> 19 -> 17 -> 2 -> 4 -> 12 -> 11 -> 7 -> 14 -> 18
    -> 15 -> 13 | Length = 6709,17
500 Ant 14: 14 -> 8 -> 1 -> 6 -> 19 -> 7 -> 18 -> 5 -> 9
    -> 2 -> 16 -> 3 -> 12 -> 11 -> 13 -> 4 -> 10 -> 17
    -> 15 -> 14 | Length = 6318,57
501 Ant 15: 15 -> 10 -> 4 -> 1 -> 8 -> 5 -> 11 -> 17 ->
    14 -> 7 -> 3 -> 2 -> 16 -> 12 -> 13 -> 9 -> 19 -> 18
    -> 6 -> 15 | Length = 6105,01
502 Ant 16: 16 -> 17 -> 5 -> 10 -> 4 -> 9 -> 13 -> 14
    -> 6 -> 1 -> 19 -> 18 -> 7 -> 15 -> 8 -> 3 -> 12
    -> 11 -> 2 -> 16 | Length = 5781,85
503 Ant 17: 17 -> 12 -> 4 -> 5 -> 8 -> 13 -> 18 -> 1 ->
    9 -> 10 -> 2 -> 11 -> 14 -> 7 -> 15 -> 16 -> 3 -> 19
    -> 6 -> 17 | Length = 6851,45
504 Ant 18: 18 -> 12 -> 9 -> 1 -> 4 -> 19 -> 2 -> 15 ->
    11 -> 17 -> 6 -> 7 -> 3 -> 16 -> 8 -> 10 -> 5 -> 14
    -> 13 -> 18 | Length = 7125,46
505 Ant 19: 19 -> 15 -> 13 -> 4 -> 12 -> 9 -> 1 -> 6 ->
    14 -> 5 -> 18 -> 8 -> 3 -> 7 -> 11 -> 2 -> 17 -> 10
    -> 16 -> 19 | Length = 6864,95
506 Best so far: 4935,41
507
508 ===== Iteration 24 =====
509 Ant 1: 1 -> 17 -> 19 -> 6 -> 7 -> 3 -> 12 -> 13 -> 4
    -> 2 -> 14 -> 11 -> 9 -> 16 -> 8 -> 15 -> 18 -> 5
    -> 10 -> 1 | Length = 6074,79
510 Ant 2: 2 -> 16 -> 3 -> 14 -> 6 -> 7 -> 4 -> 13 -> 15
    -> 11 -> 17 -> 5 -> 12 -> 9 -> 19 -> 10 -> 8 -> 1
    -> 18 -> 2 | Length = 5533,18
511 Ant 3: 3 -> 16 -> 8 -> 10 -> 1 -> 9 -> 19 -> 7 -> 15
    -> 14 -> 11 -> 12 -> 5 -> 17 -> 6 -> 2 -> 4 -> 13
    -> 18 -> 3 | Length = 6640,62
512 Ant 4: 4 -> 19 -> 18 -> 7 -> 11 -> 17 -> 2 -> 3 ->
    14 -> 9 -> 13 -> 6 -> 1 -> 16 -> 12 -> 10 -> 5 -> 15
    -> 8 -> 4 | Length = 5313,57
513 Ant 5: 5 -> 9 -> 17 -> 6 -> 7 -> 4 -> 19 -> 8 -> 1

```

|     |  |
|-----|--|
| 513 | -> 12 -> 18 -> 13 -> 15 -> 16 -> 2 -> 10 -> 11 ->    |
|     | 14 -> 3 -> 5   Length = 5711,07                      |
| 514 | Ant 6: 6 -> 14 -> 1 -> 9 -> 13 -> 11 -> 5 -> 4 -> 2  |
|     | -> 16 -> 8 -> 3 -> 19 -> 7 -> 15 -> 18 -> 12 -> 10   |
|     | -> 17 -> 6   Length = 6349,07                        |
| 515 | Ant 7: 7 -> 4 -> 19 -> 8 -> 15 -> 13 -> 1 -> 5 -> 3  |
|     | -> 2 -> 16 -> 10 -> 12 -> 11 -> 9 -> 17 -> 14 -> 6   |
|     | -> 18 -> 7   Length = 5523,75                        |
| 516 | Ant 8: 8 -> 12 -> 4 -> 1 -> 13 -> 18 -> 5 -> 9 -> 19 |
|     | -> 15 -> 11 -> 7 -> 14 -> 3 -> 2 -> 17 -> 10 -> 16   |
|     | -> 6 -> 8   Length = 6404,01                         |
| 517 | Ant 9: 9 -> 13 -> 8 -> 14 -> 3 -> 19 -> 15 -> 2 ->   |
|     | 10 -> 5 -> 18 -> 11 -> 17 -> 7 -> 6 -> 4 -> 12 -> 16 |
|     | -> 1 -> 9   Length = 6303,88                         |
| 518 | Ant 10: 10 -> 1 -> 9 -> 2 -> 15 -> 8 -> 13 -> 17 ->  |
|     | 14 -> 12 -> 4 -> 5 -> 6 -> 19 -> 18 -> 7 -> 11 -> 16 |
|     | -> 3 -> 10   Length = 6532,17                        |
| 519 | Ant 11: 11 -> 12 -> 16 -> 3 -> 7 -> 18 -> 19 -> 8    |
|     | -> 15 -> 14 -> 17 -> 2 -> 6 -> 1 -> 4 -> 10 -> 5     |
|     | -> 9 -> 13 -> 11   Length = 5194,42                  |
| 520 | Ant 12: 12 -> 6 -> 2 -> 16 -> 1 -> 18 -> 19 -> 8 ->  |
|     | 11 -> 13 -> 14 -> 3 -> 5 -> 15 -> 7 -> 4 -> 10 -> 9  |
|     | -> 17 -> 12   Length = 5824,98                       |
| 521 | Ant 13: 13 -> 12 -> 1 -> 16 -> 2 -> 10 -> 19 -> 8    |
|     | -> 5 -> 14 -> 17 -> 9 -> 7 -> 18 -> 6 -> 4 -> 3 ->   |
|     | 15 -> 11 -> 13   Length = 6192,86                    |
| 522 | Ant 14: 14 -> 3 -> 19 -> 8 -> 1 -> 18 -> 13 -> 6 ->  |
|     | 12 -> 4 -> 9 -> 16 -> 2 -> 15 -> 7 -> 17 -> 11 -> 5  |
|     | -> 10 -> 14   Length = 7440,13                       |
| 523 | Ant 15: 15 -> 8 -> 2 -> 16 -> 3 -> 7 -> 18 -> 10 ->  |
|     | 4 -> 12 -> 11 -> 17 -> 13 -> 1 -> 5 -> 9 -> 14 -> 19 |
|     | -> 6 -> 15   Length = 6835,48                        |
| 524 | Ant 16: 16 -> 2 -> 4 -> 12 -> 11 -> 7 -> 1 -> 18 ->  |
|     | 9 -> 5 -> 3 -> 8 -> 19 -> 6 -> 13 -> 15 -> 14 -> 17  |
|     | -> 10 -> 16   Length = 7055,95                       |
| 525 | Ant 17: 17 -> 19 -> 9 -> 12 -> 10 -> 2 -> 15 -> 7    |
|     | -> 16 -> 3 -> 13 -> 8 -> 6 -> 1 -> 4 -> 18 -> 5 ->   |
|     | 14 -> 11 -> 17   Length = 6771,84                    |
| 526 | Ant 18: 18 -> 7 -> 3 -> 8 -> 13 -> 14 -> 2 -> 4 ->   |
|     | 19 -> 9 -> 12 -> 11 -> 10 -> 1 -> 16 -> 15 -> 5 ->   |
|     | 17 -> 6 -> 18   Length = 5126,86                     |

```

527 Ant 19: 19 -> 17 -> 13 -> 14 -> 1 -> 10 -> 5 -> 6
      -> 15 -> 2 -> 16 -> 12 -> 11 -> 7 -> 18 -> 8 -> 4
      -> 9 -> 3 -> 19 | Length = 7303,27
528 Best so far: 4935,41
529
530 ===== Iteration 25 =====
531 Ant 1: 1 -> 10 -> 5 -> 11 -> 15 -> 13 -> 8 -> 6 ->
      17 -> 14 -> 3 -> 4 -> 19 -> 2 -> 9 -> 7 -> 18 -> 16
      -> 12 -> 1 | Length = 6331,51
532 Ant 2: 2 -> 4 -> 19 -> 18 -> 6 -> 7 -> 3 -> 16 -> 1
      -> 9 -> 17 -> 10 -> 5 -> 8 -> 15 -> 13 -> 11 -> 12
      -> 14 -> 2 | Length = 4599,57
533 Ant 3: 3 -> 14 -> 1 -> 6 -> 10 -> 9 -> 4 -> 8 -> 19
      -> 18 -> 7 -> 11 -> 17 -> 12 -> 5 -> 15 -> 16 -> 2
      -> 13 -> 3 | Length = 6218,22
534 Ant 4: 4 -> 10 -> 8 -> 1 -> 7 -> 6 -> 13 -> 9 -> 5
      -> 18 -> 16 -> 2 -> 17 -> 3 -> 14 -> 11 -> 12 -> 19
      -> 15 -> 4 | Length = 6767,09
535 Ant 5: 5 -> 3 -> 12 -> 16 -> 9 -> 19 -> 13 -> 11 ->
      10 -> 1 -> 14 -> 17 -> 6 -> 2 -> 4 -> 7 -> 18 -> 8
      -> 15 -> 5 | Length = 4887,55
536 Ant 6: 6 -> 14 -> 17 -> 5 -> 8 -> 1 -> 12 -> 11 ->
      15 -> 2 -> 16 -> 19 -> 9 -> 7 -> 18 -> 13 -> 4 -> 10
      -> 3 -> 6 | Length = 5974,73
537 Ant 7: 7 -> 15 -> 2 -> 14 -> 3 -> 16 -> 9 -> 1 -> 12
      -> 4 -> 19 -> 8 -> 13 -> 11 -> 17 -> 5 -> 6 -> 18
      -> 10 -> 7 | Length = 6220,66
538 Ant 8: 8 -> 1 -> 18 -> 13 -> 15 -> 19 -> 7 -> 6 ->
      17 -> 14 -> 5 -> 3 -> 16 -> 2 -> 4 -> 12 -> 10 -> 9
      -> 11 -> 8 | Length = 6448,36
539 Ant 9: 9 -> 1 -> 6 -> 14 -> 13 -> 4 -> 19 -> 7 -> 18
      -> 15 -> 2 -> 17 -> 11 -> 10 -> 5 -> 3 -> 8 -> 16
      -> 12 -> 9 | Length = 6328,65
540 Ant 10: 10 -> 4 -> 19 -> 17 -> 13 -> 3 -> 7 -> 18
      -> 5 -> 9 -> 16 -> 1 -> 14 -> 2 -> 15 -> 11 -> 8
      -> 12 -> 6 -> 10 | Length = 5384,32
541 Ant 11: 11 -> 12 -> 3 -> 7 -> 17 -> 14 -> 6 -> 1 ->
      13 -> 8 -> 15 -> 2 -> 16 -> 4 -> 19 -> 9 -> 5 -> 18
      -> 10 -> 11 | Length = 5582,20
542 Ant 12: 12 -> 17 -> 11 -> 13 -> 9 -> 14 -> 5 -> 18
      -> 7 -> 3 -> 16 -> 2 -> 4 -> 19 -> 8 -> 15 -> 6 ->

```

```
542 1 -> 10 -> 12 | Length = 5934,07
543 Ant 13: 13 -> 4 -> 10 -> 1 -> 6 -> 7 -> 17 -> 2 -> 8
    -> 15 -> 5 -> 14 -> 9 -> 16 -> 3 -> 19 -> 11 -> 12
    -> 18 -> 13 | Length = 6558,05
544 Ant 14: 14 -> 8 -> 15 -> 6 -> 12 -> 18 -> 7 -> 3 ->
    2 -> 19 -> 17 -> 10 -> 5 -> 4 -> 1 -> 9 -> 13 -> 16
    -> 11 -> 14 | Length = 6512,59
545 Ant 15: 15 -> 2 -> 4 -> 5 -> 11 -> 13 -> 9 -> 10 ->
    1 -> 7 -> 18 -> 6 -> 14 -> 19 -> 16 -> 3 -> 12 -> 8
    -> 17 -> 15 | Length = 5802,51
546 Ant 16: 16 -> 3 -> 14 -> 9 -> 5 -> 10 -> 4 -> 13 ->
    15 -> 8 -> 19 -> 17 -> 2 -> 11 -> 12 -> 18 -> 7 -> 1
    -> 6 -> 16 | Length = 5613,82
547 Ant 17: 17 -> 13 -> 15 -> 14 -> 1 -> 3 -> 5 -> 6 ->
    19 -> 4 -> 2 -> 9 -> 10 -> 8 -> 18 -> 11 -> 7 -> 16
    -> 12 -> 17 | Length = 6849,64
548 Ant 18: 18 -> 6 -> 5 -> 10 -> 12 -> 13 -> 4 -> 19
    -> 17 -> 14 -> 15 -> 7 -> 11 -> 16 -> 2 -> 3 -> 8
    -> 1 -> 9 -> 18 | Length = 7397,01
549 Ant 19: 19 -> 11 -> 2 -> 17 -> 6 -> 7 -> 1 -> 18 ->
    5 -> 9 -> 16 -> 3 -> 4 -> 13 -> 14 -> 10 -> 12 -> 8
    -> 15 -> 19 | Length = 6532,87
550 Best so far: 4599,57
```