|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Closest City Heuristic | | | | |
| Problem Type | Best Path Found | Distance | # Ants | Time |
| Four City Full | [3, 1, 2, 0, 3] | 143 | 10 | < 1s |
| Four City Full | [3, 1, 2, 0, 3] | 143 | 100 | < 1s |
| Four City Full | [2, 1, 3, 0, 2] | 143 | 1000 | < 1s |
| Six City Full | [1, 5, 0, 3, 2, 4, 1] | 261 | 10 | < 1s |
| Six City Full | [1, 5, 0, 3, 2, 4, 1] | 261 | 100 | < 1s |
| Six City Full | [1, 5, 0, 3, 2, 4, 1] | 261 | 1000 | < 1s |
| Eight City Full | [3, 1, 4, 5, 7, 2, 0, 6, 3] | 327 | 10 | < 1s |
| Eight City Full | [6, 3, 1, 4, 5, 7, 2, 0, 6] | 327 | 100 | < 1s |
| Eight City Full | [6, 3, 1, 4, 5, 7, 2, 0, 6] | 327 | 1000 | < 1s |
| Ten City Full | [8, 2, 5, 0, 9, 4, 7, 6, 3, 1, 8] | 286 | 10 | < 1s |
| Ten City Full | [1, 8, 2, 5, 0, 9, 4, 7, 6, 3, 1] | 286 | 100 | < 1s |
| Ten City Full | [8, 2, 5, 0, 9, 4, 7, 6, 3, 1, 8] | 286 | 1000 | < 1s |
| Twelve City Full | [10, 6, 8, 3, 0, 5, 9, 11, 2, 4, 7, 1, 10] | 312 | 10 | < 1s |
| Twelve City Full | [1, 10, 6, 8, 3, 0, 5, 9, 11, 2, 4, 7, 1] | 312 | 100 | < 1s |
| Twelve City Full | [10, 6, 8, 3, 0, 5, 9, 11, 2, 4, 7, 1, 10] | 312 | 1000 | < 1s |
| Thirty City Full | [6, 26, 9, 15, 12, 13, 22, 21, 7, 1, 27, 0, 5, 23, 17, 10, 2, 8, 3, 4, 20, 28, 19, 14, 11, 25, 24, 29, 18, 16, 6] | 348 | 100 | < 1s |
| Thirty City Full | [1, 7, 9, 15, 12, 13, 22, 21, 20, 4, 3, 8, 2, 10, 6, 26, 18, 28, 19, 14, 5, 23, 17, 16, 27, 0, 24, 25, 11, 29, 1] | 380 | 10 | < 1s |
| Thirty City Full | [6, 26, 9, 15, 12, 13, 22, 21, 7, 1, 27, 0, 5, 23, 17, 10, 2, 8, 3, 4, 20, 28, 19, 14, 11, 25, 24, 29, 18, 16, 6] | 348 | 1000 | < 1s |
| Hundred City Full | [66, 82, 22, 30, 70, 54, 64, 28, 83, 6, 7, 23, 62, 53, 16, 48, 72, 24, 49, 42, 46, 10, 87, 14, 4, 35, 50, 45, 37, 97, 81, 12, 5, 15, 58, 52, 95, 34, 90, 77, 79, 61, 65, 29, 68, 60, 91, 36, 2, 88, 78, 89, 0, 27, 39, 20, 99, 8, 18, 26, 56, 17, 32, 21, 38, 59, 71, 43, 40, 9, 94, 93, 57, 86, 47, 73, 55, 84, 33, 67, 1, 98, 3, 19, 25, 11, 41, 75, 92, 44, 80, 31, 85, 51, 74, 69, 63, 13, 76, 96, 66] | 474 | 10 | < 1s |
| Hundred City Full | [86, 47, 73, 55, 36, 2, 88, 78, 89, 0, 35, 50, 45, 37, 97, 81, 12, 5, 6, 7, 23, 62, 83, 93, 94, 74, 49, 24, 33, 65, 29, 15, 58, 52, 95, 10, 46, 75, 41, 11, 56, 17, 20, 39, 27, 30, 22, 82, 66, 64, 28, 1, 98, 34, 90, 77, 79, 70, 54, 84, 91, 60, 68, 63, 87, 14, 4, 51, 25, 19, 8, 18, 26, 57, 44, 92, 53, 16, 48, 72, 96, 99, 76, 61, 67, 38, 32, 21, 69, 40, 9, 59, 71, 43, 80, 42, 3, 13, 85, 31, 86] | 416 | 100 | 1.5s |
| Hundred City Full | [45, 37, 97, 81, 12, 5, 6, 7, 23, 62, 83, 93, 94, 74, 49, 24, 33, 65, 29, 15, 58, 52, 95, 10, 46, 75, 41, 11, 47, 73, 55, 36, 2, 88, 78, 89, 0, 35, 50, 17, 20, 39, 27, 30, 22, 82, 66, 64, 28, 1, 86, 76, 18, 26, 56, 19, 25, 84, 91, 60, 68, 63, 87, 14, 4, 51, 85, 31, 48, 72, 96, 34, 90, 77, 79, 70, 54, 99, 8, 9, 40, 69, 21, 32, 38, 59, 71, 43, 80, 42, 16, 53, 92, 44, 57, 98, 3, 13, 67, 61, 45] | 407 | 1000 | 3s |
| Three Hundred City Full | [280, 15, 40, 214, 28, 115, 26, 116, 133, 2, 18, 10, 70, 111, 257, 54, 85, 217, 52, 211, 143, 102, 1, 282, 16, 51, 42, 106, 48, 156, 76, 227, 117, 19, 46, 125, 9, 144, 182, 6, 36, 136, 83, 20, 66, 61, 14, 187, 25, 186, 99, 229, 272, 203, 17, 174, 196, 105, 22, 38, 226, 152, 167, 191, 84, 223, 31, 101, 12, 88, 208, 163, 96, 140, 41, 44, 64, 33, 232, 260, 35, 27, 60, 7, 269, 147, 73, 75, 231, 0, 283, 146, 113, 24, 121, 157, 5, 4, 237, 286, 188, 254, 233, 67, 165, 87, 72, 90, 103, 178, 108, 205, 23, 119, 273, 94, 180, 43, 110, 263, 216, 29, 82, 77, 37, 224, 130, 69, 78, 261, 194, 195, 120, 230, 267, 256, 253, 278, 39, 45, 123, 185, 244, 291, 32, 218, 104, 93, 8, 145, 245, 206, 255, 293, 161, 107, 122, 181, 210, 138, 150, 98, 238, 222, 95, 175, 296, 135, 13, 55, 139, 59, 168, 81, 11, 50, 155, 153, 250, 49, 97, 58, 200, 215, 221, 89, 79, 128, 258, 248, 246, 236, 298, 249, 204, 290, 109, 158, 171, 100, 141, 201, 142, 118, 30, 179, 134, 264, 137, 240, 184, 265, 124, 251, 297, 299, 159, 190, 151, 239, 209, 148, 62, 193, 112, 132, 235, 71, 252, 172, 80, 154, 65, 198, 92, 219, 212, 284, 56, 47, 287, 279, 91, 197, 274, 247, 271, 294, 266, 114, 189, 127, 131, 275, 86, 234, 295, 74, 162, 213, 177, 126, 34, 63, 228, 173, 3, 259, 21, 268, 292, 149, 289, 225, 192, 68, 183, 166, 243, 276, 199, 57, 169, 241, 160, 53, 129, 176, 277, 270, 242, 220, 262, 202, 288, 170, 207, 281, 164, 285, 280] | 645 | 10 | 9s |
| Three Hundred City Full | [267, 214, 28, 115, 26, 116, 133, 2, 18, 10, 70, 111, 257, 54, 85, 217, 52, 211, 143, 102, 1, 282, 16, 51, 42, 106, 48, 156, 76, 227, 117, 19, 46, 125, 9, 144, 182, 6, 36, 136, 83, 20, 66, 61, 14, 187, 25, 186, 99, 229, 272, 203, 17, 174, 196, 105, 22, 38, 226, 152, 167, 191, 84, 223, 31, 101, 12, 88, 208, 163, 96, 140, 41, 44, 64, 33, 232, 260, 35, 27, 60, 7, 269, 147, 73, 75, 231, 0, 283, 146, 113, 24, 121, 157, 5, 4, 237, 40, 15, 148, 209, 239, 55, 13, 112, 89, 79, 128, 168, 59, 219, 92, 149, 289, 100, 141, 201, 142, 45, 39, 278, 72, 87, 165, 67, 233, 224, 37, 77, 82, 29, 216, 270, 277, 122, 181, 210, 138, 150, 98, 238, 222, 95, 175, 296, 135, 189, 114, 266, 284, 56, 179, 30, 118, 134, 130, 69, 78, 261, 94, 180, 43, 110, 263, 169, 119, 23, 129, 176, 57, 199, 65, 154, 80, 172, 246, 236, 298, 249, 161, 107, 32, 218, 104, 93, 8, 145, 245, 194, 195, 120, 230, 91, 279, 3, 173, 228, 63, 34, 126, 137, 240, 184, 200, 58, 97, 49, 212, 265, 124, 251, 103, 90, 220, 247, 11, 50, 155, 153, 250, 256, 253, 206, 255, 293, 74, 162, 213, 177, 158, 171, 198, 170, 81, 285, 139, 271, 294, 273, 109, 290, 204, 286, 188, 254, 131, 127, 258, 248, 164, 159, 190, 108, 178, 123, 185, 244, 291, 275, 86, 234, 295, 207, 268, 21, 259, 281, 205, 241, 160, 53, 47, 287, 297, 299, 225, 151, 242, 221, 215, 193, 62, 68, 183, 166, 243, 276, 132, 235, 71, 252, 262, 202, 288, 292, 274, 197, 280, 192, 264, 267] | 566 | 100 | 15s |
| Three Hundred City Full | [267, 214, 28, 115, 26, 116, 133, 2, 18, 10, 70, 111, 257, 54, 85, 217, 52, 211, 143, 102, 1, 282, 16, 51, 42, 106, 48, 156, 76, 227, 117, 19, 46, 125, 9, 144, 182, 6, 36, 136, 83, 20, 66, 61, 14, 187, 25, 186, 99, 229, 272, 203, 17, 174, 196, 105, 22, 38, 226, 152, 167, 191, 84, 223, 31, 101, 12, 88, 208, 163, 96, 140, 41, 44, 64, 33, 232, 260, 35, 27, 60, 7, 269, 147, 73, 75, 231, 0, 283, 146, 113, 24, 121, 157, 5, 4, 237, 40, 15, 148, 209, 239, 55, 13, 112, 89, 79, 128, 168, 59, 219, 92, 149, 289, 100, 141, 201, 142, 45, 39, 278, 72, 87, 165, 67, 233, 224, 37, 77, 82, 29, 216, 270, 277, 122, 181, 210, 138, 150, 98, 238, 222, 95, 175, 296, 135, 189, 114, 266, 284, 56, 179, 30, 118, 134, 130, 69, 78, 261, 94, 180, 43, 110, 263, 169, 119, 23, 129, 176, 57, 199, 65, 154, 80, 172, 246, 236, 298, 249, 161, 107, 32, 218, 104, 93, 8, 145, 245, 194, 195, 120, 230, 91, 279, 3, 173, 228, 63, 34, 126, 137, 240, 184, 200, 58, 97, 49, 212, 265, 124, 251, 103, 90, 220, 247, 11, 50, 155, 153, 250, 256, 253, 206, 255, 293, 74, 162, 213, 177, 158, 171, 198, 170, 81, 285, 139, 271, 294, 273, 109, 290, 204, 286, 188, 254, 131, 127, 258, 248, 164, 159, 190, 108, 178, 123, 185, 244, 291, 275, 86, 234, 295, 207, 268, 21, 259, 281, 205, 241, 160, 53, 47, 287, 297, 299, 225, 151, 242, 221, 215, 193, 62, 68, 183, 166, 243, 276, 132, 235, 71, 252, 262, 202, 288, 292, 274, 197, 280, 192, 264, 267] | 566 | 1000 | 1m |
| Thirty City Sparse | Failed | --- | 10 |  |
| Thirty City Sparse | Failed | --- | 100 |  |
| Thirty City Sparse | Failed | --- | 1000 |  |
| Hundred City Sparse | Failed | --- | 10 |  |
| Hundred City Sparse | Failed | --- | 100 |  |
| Hundred City Sparse | Failed | --- | 1000 |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Weighted Probability | | | | |
| Problem Type | Best Path Found | Distance | # Ants | Time |
| Four City Full | [0, 3, 1, 2, 0] | 143 | 10 | < 1s |
| Four City Full | [3, 1, 2, 0, 3] | 143 | 100 | < 1s |
| Four City Full | [2, 0, 3, 1, 2] | 143 | 1000 | < 1s |
| Six City Full | [0, 5, 1, 2, 3, 4, 0] | 267 | 10 | < 1s |
| Six City Full | [1, 5, 0, 3, 2, 4, 1] | 261 | 100 | < 1s |
| Six City Full | [0, 5, 1, 4, 2, 3, 0] | 261 | 1000 | < 1s |
| Eight City Full | [5, 0, 2, 1, 3, 4, 6, 7, 5] | 324 | 10 | < 1s |
| Eight City Full | [7, 5, 0, 2, 1, 3, 6, 4, 7] | 296 | 100 | < 1s |
| Eight City Full | [0, 2, 1, 3, 6, 4, 7, 5, 0] | 296 | 1000 | < 1s |
| Ten City Full | [0, 3, 5, 7, 6, 1, 8, 2, 4, 9, 0] | 351 | 10 | < 1s |
| Ten City Full | [1, 0, 5, 7, 4, 9, 3, 6, 2, 8, 1] | 286 | 100 | < 1s |
| Ten City Full | [1, 8, 2, 5, 7, 4, 9, 0, 3, 6, 1] | 275 | 1000 | < 1s |
| Twelve City Full | [7, 9, 11, 6, 1, 10, 3, 0, 5, 8, 2, 4, 7] | 329 | 10 | < 1s |
| Twelve City Full | [7, 8, 2, 4, 6, 3, 10, 1, 0, 5, 9, 11, 7] | 306 | 100 | < 1s |
| Twelve City Full | [1, 10, 6, 4, 2, 11, 5, 0, 3, 8, 7, 9, 1] | 272 | 1000 | 1s |
| Thirty City Full | [25, 27, 0, 4, 7, 1, 16, 9, 2, 3, 8, 28, 21, 20, 19, 24, 23, 17, 12, 5, 6, 10, 13, 26, 15, 18, 22, 29, 14, 11, 25] | 940 | 100 | < 1s |
| Thirty City Full | [9, 15, 14, 4, 20, 29, 25, 24, 7, 26, 3, 18, 8, 2, 12, 23, 16, 17, 13, 22, 21, 1, 10, 27, 0, 5, 19, 28, 11, 6, 9] | 798 | 10 | < 1s |
| Thirty City Full | [6, 26, 9, 14, 25, 2, 10, 17, 29, 1, 11, 18, 19, 15, 24, 21, 7, 28, 27, 0, 4, 20, 22, 13, 12, 5, 23, 16, 3, 8, 6] | 731 | 1000 | 2s |
| Thirty City Full | [5, 27, 0, 4, 20, 3, 8, 25, 22, 21, 24, 1, 2, 10, 6, 26, 18, 7, 29, 13, 17, 12, 23, 16, 9, 15, 19, 14, 28, 11, 5] | 710 | 1000 | 2s |
| Hundred City Full | [70, 17, 53, 1, 64, 48, 68, 11, 39, 96, 9, 24, 81, 97, 12, 82, 60, 36, 84, 43, 69, 31, 85, 67, 27, 14, 61, 35, 28, 63, 52, 41, 5, 42, 8, 66, 26, 45, 77, 79, 30, 44, 86, 76, 88, 59, 94, 99, 6, 83, 98, 10, 54, 75, 34, 91, 3, 33, 40, 7, 65, 57, 92, 16, 37, 89, 55, 74, 51, 72, 23, 22, 38, 4, 46, 62, 32, 78, 93, 13, 15, 29, 25, 47, 19, 49, 0, 80, 21, 95, 2, 90, 50, 87, 58, 71, 20, 73, 56, 18, 70] | 3885 | 10 | < 1s |
| Hundred City Full | [76, 18, 94, 86, 16, 55, 79, 90, 38, 67, 95, 61, 41, 53, 23, 64, 36, 63, 84, 25, 31, 45, 0, 99, 39, 88, 85, 49, 9, 80, 10, 37, 43, 71, 59, 58, 65, 66, 24, 47, 12, 3, 11, 57, 29, 77, 74, 40, 6, 21, 96, 97, 81, 20, 75, 17, 52, 50, 93, 78, 44, 30, 54, 8, 14, 4, 87, 69, 98, 26, 48, 13, 89, 73, 34, 32, 19, 82, 51, 68, 56, 7, 42, 35, 22, 15, 83, 72, 60, 92, 28, 46, 1, 33, 2, 5, 27, 91, 62, 70, 76] | 3522 | 100 | 2s |
| Hundred City Full | [95, 18, 81, 76, 42, 15, 21, 2, 68, 39, 93, 61, 65, 10, 87, 32, 50, 86, 46, 75, 80, 25, 19, 83, 20, 82, 8, 7, 12, 41, 33, 3, 17, 4, 88, 47, 79, 77, 59, 35, 0, 89, 63, 29, 67, 27, 11, 69, 40, 71, 53, 16, 1, 62, 73, 55, 92, 26, 60, 54, 57, 90, 22, 30, 43, 38, 56, 34, 6, 5, 72, 48, 13, 36, 91, 23, 98, 96, 14, 52, 58, 99, 31, 45, 37, 97, 64, 28, 51, 85, 44, 9, 78, 84, 49, 24, 94, 74, 66, 70, 95] | 2958 | 1000 | 18s |
| Three Hundred City Full | [130, 261, 7, 91, 196, 56, 136, 258, 129, 288, 284, 135, 41, 227, 295, 147, 96, 275, 58, 206, 1, 124, 46, 122, 217, 39, 15, 282, 92, 271, 255, 103, 66, 6, 111, 208, 4, 243, 120, 88, 116, 110, 155, 153, 234, 55, 250, 173, 211, 2, 293, 18, 123, 108, 162, 9, 291, 251, 81, 37, 20, 179, 260, 221, 64, 150, 27, 280, 273, 99, 141, 183, 126, 107, 95, 118, 190, 71, 52, 17, 242, 214, 181, 254, 35, 249, 248, 270, 62, 29, 152, 26, 22, 78, 199, 101, 12, 98, 25, 222, 240, 177, 165, 47, 213, 142, 212, 113, 182, 257, 197, 16, 245, 115, 237, 102, 236, 195, 289, 31, 87, 89, 272, 151, 247, 167, 219, 189, 63, 24, 128, 104, 226, 230, 28, 294, 176, 119, 133, 263, 143, 146, 191, 84, 93, 201, 125, 70, 86, 186, 8, 49, 297, 21, 184, 100, 34, 30, 215, 138, 210, 174, 33, 232, 114, 61, 83, 159, 200, 74, 267, 3, 168, 244, 137, 45, 170, 19, 265, 279, 43, 223, 144, 209, 14, 148, 158, 40, 235, 59, 204, 281, 188, 54, 216, 192, 220, 296, 266, 198, 268, 246, 283, 241, 164, 277, 287, 11, 231, 13, 97, 290, 218, 67, 224, 112, 160, 57, 171, 205, 228, 238, 117, 106, 172, 207, 298, 229, 194, 76, 161, 274, 23, 239, 262, 132, 286, 140, 38, 169, 42, 292, 105, 32, 85, 178, 72, 202, 36, 0, 193, 276, 109, 278, 299, 145, 48, 156, 65, 131, 264, 51, 256, 77, 82, 134, 127, 5, 94, 80, 44, 157, 166, 90, 203, 285, 139, 175, 10, 149, 163, 225, 121, 180, 73, 68, 79, 53, 75, 253, 50, 269, 154, 233, 69, 60, 187, 185, 252, 259, 130] | 13917 | 10 | 13s |
| Three Hundred City Full | [19, 10, 105, 3, 103, 246, 212, 60, 277, 194, 297, 263, 206, 171, 259, 73, 75, 295, 169, 7, 96, 268, 5, 238, 85, 200, 188, 127, 90, 186, 294, 30, 256, 29, 82, 232, 31, 126, 83, 41, 293, 267, 239, 140, 135, 20, 28, 81, 43, 158, 211, 55, 178, 11, 197, 17, 287, 213, 18, 278, 180, 74, 296, 128, 153, 125, 139, 32, 15, 156, 201, 142, 107, 52, 165, 225, 195, 6, 36, 93, 8, 252, 167, 216, 67, 233, 109, 177, 230, 72, 24, 183, 276, 87, 189, 209, 116, 22, 174, 112, 141, 231, 0, 65, 159, 184, 266, 121, 289, 219, 207, 272, 147, 26, 50, 208, 160, 78, 86, 262, 47, 51, 229, 221, 150, 84, 40, 124, 9, 255, 100, 155, 236, 162, 98, 202, 258, 182, 42, 92, 119, 176, 220, 148, 130, 298, 215, 166, 99, 122, 69, 94, 14, 144, 16, 283, 111, 273, 173, 101, 76, 149, 299, 48, 46, 170, 279, 102, 27, 136, 271, 199, 286, 157, 269, 39, 261, 187, 154, 175, 110, 228, 45, 290, 163, 205, 88, 123, 161, 134, 185, 248, 234, 77, 59, 274, 247, 113, 285, 79, 34, 13, 237, 249, 204, 44, 91, 250, 1, 282, 192, 191, 218, 181, 265, 243, 253, 224, 264, 138, 118, 33, 106, 284, 244, 240, 80, 89, 280, 151, 291, 63, 70, 54, 241, 145, 245, 95, 288, 235, 222, 164, 71, 38, 203, 56, 196, 146, 23, 115, 193, 226, 62, 57, 49, 190, 12, 53, 152, 61, 242, 214, 21, 4, 172, 131, 275, 114, 133, 129, 120, 143, 2, 260, 137, 68, 35, 270, 227, 132, 254, 217, 292, 210, 37, 179, 25, 104, 117, 223, 97, 251, 108, 64, 281, 198, 66, 168, 58, 257, 19] | 12943 | 100 | 40s |
| Three Hundred City Full | [90, 128, 146, 171, 157, 162, 136, 118, 254, 190, 122, 239, 67, 159, 117, 269, 285, 76, 263, 161, 208, 294, 210, 178, 72, 13, 62, 291, 247, 55, 241, 49, 277, 147, 104, 164, 134, 2, 215, 12, 65, 60, 75, 45, 245, 201, 216, 185, 115, 66, 42, 196, 51, 41, 44, 272, 266, 184, 180, 170, 204, 124, 0, 174, 149, 145, 92, 225, 244, 200, 18, 211, 173, 198, 8, 132, 28, 86, 153, 121, 191, 85, 1, 101, 107, 202, 105, 214, 165, 48, 156, 7, 91, 23, 246, 102, 274, 106, 206, 236, 158, 176, 20, 298, 218, 96, 81, 58, 19, 160, 222, 39, 212, 97, 226, 30, 268, 182, 192, 116, 217, 130, 36, 167, 152, 84, 257, 238, 252, 59, 144, 98, 53, 219, 111, 273, 87, 261, 78, 108, 83, 264, 137, 21, 33, 250, 15, 40, 290, 80, 110, 207, 155, 126, 47, 56, 114, 189, 154, 230, 133, 63, 73, 175, 293, 278, 141, 135, 253, 16, 6, 4, 64, 232, 150, 61, 224, 37, 77, 125, 220, 209, 139, 24, 271, 50, 203, 183, 35, 95, 286, 88, 199, 71, 82, 186, 43, 57, 255, 100, 251, 26, 188, 143, 14, 177, 109, 112, 260, 187, 5, 169, 11, 54, 89, 142, 29, 287, 297, 32, 242, 27, 172, 258, 131, 123, 194, 205, 181, 103, 231, 31, 99, 228, 262, 282, 151, 69, 10, 119, 22, 256, 25, 276, 283, 138, 168, 234, 74, 221, 233, 299, 249, 243, 279, 229, 227, 270, 259, 129, 195, 235, 213, 38, 179, 120, 9, 140, 267, 17, 3, 163, 127, 46, 289, 292, 113, 265, 197, 280, 248, 68, 94, 237, 52, 281, 240, 34, 193, 70, 93, 166, 275, 79, 288, 223, 284, 295, 148, 296, 90] | 12853 | 1000 | 5m |
| Three Hundred City Full | [14, 3, 206, 272, 45, 82, 185, 298, 242, 121, 107, 279, 259, 182, 296, 281, 106, 254, 69, 199, 104, 167, 33, 24, 74, 18, 244, 222, 191, 165, 144, 231, 93, 293, 4, 276, 101, 13, 129, 29, 216, 257, 16, 176, 250, 252, 138, 255, 117, 241, 36, 37, 264, 154, 139, 112, 210, 209, 87, 178, 299, 201, 287, 8, 48, 211, 135, 221, 6, 174, 280, 47, 260, 170, 226, 111, 141, 31, 229, 148, 94, 61, 79, 282, 38, 85, 72, 269, 175, 67, 133, 189, 288, 80, 180, 198, 290, 55, 214, 70, 159, 187, 51, 21, 230, 147, 98, 142, 99, 194, 200, 12, 155, 234, 83, 249, 248, 172, 65, 5, 102, 17, 163, 266, 88, 26, 30, 156, 294, 157, 171, 11, 232, 245, 291, 134, 95, 34, 90, 91, 223, 127, 224, 271, 113, 23, 136, 166, 22, 169, 0, 177, 35, 153, 277, 273, 109, 204, 258, 7, 115, 100, 168, 58, 130, 92, 219, 66, 119, 208, 162, 251, 267, 215, 25, 181, 203, 228, 188, 42, 196, 227, 193, 261, 108, 286, 140, 126, 270, 220, 225, 131, 150, 97, 143, 173, 268, 240, 238, 278, 60, 54, 247, 274, 64, 207, 81, 284, 246, 243, 275, 146, 10, 145, 161, 202, 118, 235, 43, 283, 262, 105, 239, 289, 218, 179, 160, 56, 28, 19, 71, 137, 44, 128, 57, 53, 68, 183, 297, 116, 197, 78, 52, 120, 195, 41, 84, 49, 59, 151, 192, 285, 158, 86, 96, 265, 213, 20, 9, 76, 263, 77, 164, 50, 103, 123, 40, 15, 122, 217, 295, 237, 39, 149, 73, 233, 62, 132, 256, 89, 125, 46, 190, 186, 32, 184, 63, 152, 212, 236, 1, 205, 110, 27, 124, 75, 253, 114, 2, 292, 14] | 12769 | 1000 | 5m |
| Thirty City Sparse | Failed | --- | 100 |  |
| Thirty City Sparse | Failed | --- | 1000 |  |
| Thirty City Sparse | [2, 13, 23, 26, 27, 5, 7, 4, 16, 1, 12, 10, 6, 29, 25, 21, 24, 9, 20, 17, 28, 15, 8, 22, 14, 19, 11, 18, 0, 3, 2] | 1345 | 10000 | 3m |
| Thirty City Sparse | [10, 6, 29, 25, 22, 14, 7, 5, 27, 24, 21, 3, 0, 18, 11, 19, 26, 23, 13, 2, 9, 20, 17, 28, 15, 8, 4, 16, 1, 12, 10] | 1320 | 10000 | 3m |
| Thirty City Sparse | [29, 6, 10, 12, 1, 16, 4, 14, 7, 5, 27, 26, 22, 8, 15, 28, 17, 20, 23, 13, 2, 9, 24, 21, 3, 0, 18, 11, 19, 25, 29] | 1401 | 10000 | 3m |
| Hundred City Sparse | Failed | --- | 1000 |  |
| Hundred City Sparse | Failed |  | 5000 |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Weighted Probability Heuristic Without Distance | | | | |
| Problem Type | Best Path Found | Distance | # Ants | Time |
| Four City Full | [2, 1, 3, 0, 2] | 143 | 10 | < 1s |
| Four City Full | [2, 0, 3, 1, 2] | 143 | 100 | < 1s |
| Four City Full | [2, 0, 3, 1, 2] | 143 | 1000 | < 1s |
| Six City Full | [0, 5, 1, 4, 2, 3, 0] | 261 | 10 | < 1s |
| Six City Full | [5, 1, 4, 2, 3, 0, 5] | 261 | 100 | < 1s |
| Six City Full | [1, 5, 0, 3, 2, 4, 1] | 261 | 1000 | < 1s |
| Eight City Full | [7, 6, 2, 0, 4, 1, 3, 5, 7] | 365 | 10 | < 1s |
| Eight City Full | [4, 5, 7, 6, 3, 1, 2, 0, 4] | 335 | 100 | < 1s |
| Eight City Full | [3, 5, 7, 4, 6, 0, 2, 1, 3] | 311 | 1000 | < 1s |
| Ten City Full | [3, 7, 9, 0, 5, 1, 6, 8, 2, 4, 3] | 468 | 10 | < 1s |
| Ten City Full | [3, 6, 7, 4, 9, 5, 0, 1, 8, 2, 3] | 343 | 100 | < 1s |
| Ten City Full | [4, 7, 5, 0, 3, 6, 2, 8, 1, 9, 4] | 316 | 1000 | 1s |
| Twelve City Full | [7, 8, 6, 10, 4, 9, 1, 2, 3, 0, 5, 11, 7] | 444 | 10 | < 1s |
| Twelve City Full | [2, 4, 9, 5, 0, 6, 8, 3, 1, 11, 10, 7, 2] | 425 | 100 | < 1s |
| Twelve City Full | [1, 11, 2, 4, 10, 6, 3, 0, 5, 8, 7, 9, 1] | 342 | 1000 | 1s |
| Thirty City Full | [10, 28, 2, 25, 4, 29, 14, 3, 7, 13, 19, 24, 18, 17, 15, 12, 8, 0, 1, 11, 21, 20, 26, 16, 27, 5, 23, 22, 6, 9, 10] | 1276 | 10 | < 1s |
| Thirty City Full | [8, 9, 13, 29, 25, 24, 19, 28, 14, 27, 6, 0, 20, 3, 26, 21, 16, 12, 15, 22, 11, 1, 4, 10, 23, 17, 2, 5, 7, 18, 8] | 1150 | 100 | < 1s |
| Thirty City Full | [16, 6, 13, 23, 12, 28, 27, 4, 20, 8, 14, 17, 7, 3, 2, 15, 26, 0, 10, 24, 29, 9, 19, 21, 1, 25, 18, 22, 11, 5, 16] | 1127 | 100 | < 1s |
| Thirty City Full | [16, 1, 21, 24, 20, 29, 5, 19, 17, 7, 18, 8, 11, 14, 0, 6, 15, 12, 22, 3, 23, 10, 28, 25, 2, 13, 9, 26, 4, 27, 16] | 1085 | 1000 | 2s |
| Hundred City Full | [64, 32, 60, 58, 27, 35, 86, 71, 40, 3, 88, 93, 50, 48, 59, 1, 14, 89, 63, 7, 67, 15, 18, 42, 4, 95, 25, 72, 0, 73, 47, 34, 66, 16, 51, 65, 55, 90, 53, 68, 19, 81, 83, 57, 28, 85, 91, 97, 62, 94, 74, 70, 21, 17, 76, 20, 37, 11, 36, 39, 44, 56, 13, 52, 43, 30, 24, 49, 79, 78, 82, 45, 22, 77, 26, 87, 29, 98, 2, 99, 33, 8, 10, 6, 41, 92, 23, 12, 5, 31, 9, 69, 96, 61, 80, 75, 38, 54, 46, 84, 64] | 4540 | 10 | < 1s |
| Hundred City Full | [70, 86, 6, 78, 41, 25, 87, 46, 18, 34, 96, 42, 97, 48, 72, 66, 16, 15, 3, 89, 55, 92, 27, 35, 57, 49, 69, 44, 24, 31, 22, 9, 74, 83, 99, 20, 28, 62, 4, 88, 7, 23, 94, 8, 65, 77, 19, 73, 13, 63, 40, 2, 33, 0, 36, 84, 90, 10, 95, 32, 14, 17, 50, 56, 45, 64, 80, 75, 59, 58, 67, 38, 85, 81, 76, 11, 37, 61, 68, 30, 52, 29, 91, 51, 60, 39, 93, 5, 1, 54, 12, 47, 98, 26, 82, 79, 71, 53, 43, 21, 70] | 4192 | 100 | 1s |
| Hundred City Full | [9, 35, 51, 74, 43, 64, 20, 27, 94, 1, 11, 24, 75, 60, 19, 38, 13, 71, 69, 49, 79, 70, 0, 44, 42, 86, 59, 12, 15, 34, 61, 56, 77, 78, 26, 18, 92, 66, 48, 62, 29, 41, 97, 36, 80, 37, 45, 2, 10, 72, 89, 91, 46, 58, 31, 47, 4, 5, 52, 98, 39, 50, 93, 67, 76, 95, 22, 30, 63, 21, 88, 83, 7, 14, 82, 81, 54, 32, 25, 17, 40, 65, 99, 90, 87, 53, 28, 23, 68, 6, 16, 85, 84, 33, 3, 73, 57, 55, 96, 8, 9] | 4346 | 100 | 1s |
| Hundred City Full | [54, 72, 91, 38, 88, 48, 64, 57, 49, 34, 31, 40, 71, 47, 21, 97, 20, 52, 94, 86, 26, 80, 60, 15, 17, 76, 70, 6, 73, 75, 3, 87, 77, 58, 25, 95, 13, 19, 85, 51, 99, 55, 28, 12, 14, 43, 62, 23, 42, 29, 93, 27, 81, 67, 22, 46, 10, 59, 24, 56, 44, 33, 16, 90, 96, 50, 9, 84, 63, 61, 30, 5, 11, 8, 92, 98, 78, 32, 45, 69, 79, 1, 35, 83, 89, 82, 4, 41, 2, 53, 66, 68, 36, 74, 39, 7, 0, 37, 65, 18, 54] | 4106 | 100 | 12 |
| Hundred City Full | [34, 32, 90, 20, 53, 87, 69, 73, 57, 72, 48, 59, 93, 25, 74, 60, 67, 68, 51, 5, 44, 79, 92, 19, 47, 54, 26, 18, 95, 61, 65, 64, 17, 62, 49, 7, 14, 39, 80, 45, 2, 76, 40, 42, 22, 52, 29, 77, 33, 10, 46, 16, 82, 41, 98, 1, 86, 9, 11, 58, 6, 30, 71, 83, 66, 81, 24, 15, 97, 38, 94, 56, 12, 3, 63, 27, 0, 35, 8, 85, 55, 13, 36, 84, 4, 50, 43, 31, 88, 78, 23, 91, 75, 37, 89, 99, 70, 28, 96, 21, 34] | 4079 | 1000 | 10s |
| Hundred City Full | [32, 97, 10, 87, 9, 26, 83, 62, 68, 22, 38, 91, 40, 20, 29, 63, 23, 6, 98, 51, 2, 12, 96, 50, 49, 61, 35, 46, 80, 94, 43, 1, 56, 95, 72, 59, 58, 27, 84, 47, 15, 28, 17, 67, 89, 73, 14, 16, 75, 54, 60, 37, 45, 69, 34, 65, 48, 24, 55, 52, 90, 78, 82, 39, 36, 19, 76, 5, 11, 53, 74, 7, 41, 81, 70, 21, 4, 64, 8, 79, 66, 88, 77, 3, 86, 93, 33, 85, 42, 71, 18, 99, 31, 92, 44, 13, 25, 30, 57, 0, 32] | 3982 | 1000 | 10s |
| Hundred City Full | [72, 52, 30, 81, 57, 97, 77, 78, 6, 87, 54, 85, 51, 22, 8, 84, 47, 27, 21, 28, 53, 55, 2, 12, 13, 89, 24, 62, 7, 86, 61, 74, 59, 43, 5, 82, 42, 98, 20, 9, 11, 19, 99, 63, 90, 38, 71, 1, 96, 39, 33, 23, 37, 73, 65, 40, 48, 94, 49, 60, 44, 76, 16, 68, 41, 18, 83, 0, 32, 70, 46, 79, 75, 25, 67, 3, 69, 80, 45, 10, 56, 17, 64, 92, 88, 91, 4, 93, 31, 26, 14, 95, 58, 50, 29, 35, 36, 66, 34, 15, 72] | 4071 | 1000 | 10s |
| Three Hundred City Full | [178, 14, 127, 15, 76, 246, 291, 96, 267, 79, 186, 106, 71, 92, 9, 134, 195, 103, 63, 66, 1, 93, 158, 149, 226, 47, 8, 135, 131, 85, 233, 32, 105, 280, 95, 216, 169, 167, 268, 49, 172, 80, 196, 294, 162, 41, 242, 148, 7, 188, 116, 182, 177, 70, 31, 271, 146, 220, 2, 277, 225, 215, 273, 123, 262, 22, 209, 109, 11, 104, 252, 23, 175, 147, 138, 160, 251, 279, 78, 144, 13, 224, 173, 265, 143, 155, 83, 184, 30, 150, 282, 189, 264, 247, 154, 88, 238, 207, 39, 73, 183, 288, 75, 170, 44, 293, 210, 18, 222, 290, 249, 299, 200, 101, 118, 50, 36, 286, 199, 57, 284, 274, 254, 253, 255, 237, 128, 192, 99, 122, 25, 119, 190, 46, 272, 53, 218, 201, 223, 257, 194, 171, 297, 35, 90, 141, 100, 113, 89, 10, 81, 107, 289, 86, 98, 110, 64, 54, 228, 240, 24, 108, 239, 28, 295, 140, 156, 48, 115, 114, 266, 208, 34, 234, 229, 296, 168, 283, 236, 235, 250, 164, 94, 263, 74, 278, 221, 180, 62, 204, 163, 241, 174, 97, 206, 285, 176, 67, 145, 19, 298, 43, 21, 38, 112, 133, 5, 55, 3, 185, 129, 198, 72, 137, 142, 136, 165, 56, 29, 281, 4, 59, 287, 157, 259, 205, 33, 58, 61, 161, 212, 202, 159, 69, 211, 151, 120, 68, 117, 219, 16, 269, 214, 40, 197, 231, 261, 77, 275, 17, 187, 292, 45, 91, 217, 52, 60, 243, 27, 121, 132, 42, 166, 203, 87, 245, 0, 82, 51, 37, 276, 26, 260, 153, 248, 124, 258, 270, 6, 230, 232, 84, 126, 193, 256, 139, 213, 65, 20, 152, 12, 227, 191, 244, 130, 125, 102, 111, 179, 181, 178] | 14381 | 10 | 18s |
| Three Hundred City Full | [266, 112, 68, 173, 265, 281, 150, 98, 169, 40, 12, 191, 113, 130, 152, 205, 151, 65, 216, 181, 174, 237, 36, 240, 133, 200, 227, 210, 109, 207, 212, 39, 139, 162, 177, 116, 64, 48, 180, 276, 67, 290, 102, 79, 0, 132, 8, 30, 275, 11, 244, 91, 31, 17, 263, 194, 120, 247, 246, 108, 213, 243, 222, 286, 229, 179, 215, 115, 61, 83, 47, 77, 34, 53, 89, 118, 19, 141, 13, 299, 111, 297, 193, 228, 127, 119, 261, 211, 283, 63, 284, 197, 7, 185, 32, 85, 279, 147, 164, 187, 134, 253, 107, 186, 270, 100, 204, 220, 267, 51, 101, 122, 148, 28, 165, 33, 225, 62, 80, 15, 140, 274, 291, 280, 110, 160, 202, 88, 146, 190, 18, 232, 99, 184, 55, 236, 10, 50, 22, 294, 87, 231, 106, 23, 143, 66, 217, 183, 245, 192, 5, 188, 178, 256, 252, 71, 142, 226, 27, 29, 123, 1, 208, 153, 35, 4, 230, 84, 264, 170, 14, 72, 44, 41, 235, 224, 54, 269, 262, 298, 273, 97, 195, 82, 73, 218, 255, 21, 289, 172, 2, 117, 157, 161, 268, 145, 75, 282, 259, 59, 42, 93, 20, 242, 159, 92, 209, 167, 70, 16, 136, 221, 234, 206, 239, 125, 154, 144, 124, 214, 296, 278, 287, 248, 223, 199, 129, 43, 76, 166, 9, 176, 257, 171, 288, 238, 233, 203, 254, 138, 58, 271, 96, 46, 74, 250, 3, 86, 168, 94, 103, 131, 189, 37, 260, 90, 105, 137, 126, 182, 57, 292, 155, 293, 156, 121, 114, 25, 251, 277, 196, 158, 45, 60, 249, 258, 26, 163, 295, 175, 285, 104, 81, 95, 128, 24, 149, 135, 201, 49, 69, 272, 219, 38, 241, 56, 198, 78, 6, 52, 266] | 14016 | 100 | 40s |
| Three Hundred City Full | [38, 241, 35, 238, 294, 99, 254, 251, 250, 4, 6, 66, 67, 272, 1, 122, 108, 182, 248, 213, 34, 249, 150, 80, 111, 163, 256, 133, 219, 198, 98, 13, 61, 3, 43, 262, 185, 245, 227, 105, 212, 88, 194, 282, 141, 253, 152, 292, 30, 283, 126, 138, 203, 218, 278, 55, 171, 293, 157, 223, 211, 273, 48, 112, 56, 149, 144, 247, 129, 69, 181, 42, 136, 187, 151, 269, 52, 39, 259, 116, 290, 275, 9, 158, 147, 87, 40, 209, 243, 143, 287, 109, 31, 20, 10, 145, 89, 169, 201, 160, 57, 176, 23, 21, 228, 162, 291, 85, 16, 78, 267, 26, 81, 270, 130, 14, 104, 178, 179, 114, 36, 2, 103, 170, 222, 86, 121, 217, 216, 173, 45, 0, 140, 37, 5, 117, 242, 22, 46, 284, 82, 119, 297, 101, 204, 131, 124, 58, 280, 288, 226, 237, 71, 62, 276, 239, 244, 110, 189, 29, 266, 139, 64, 79, 195, 49, 164, 258, 7, 257, 59, 299, 161, 177, 83, 60, 68, 279, 174, 234, 135, 70, 41, 33, 183, 286, 102, 235, 192, 53, 285, 142, 165, 188, 277, 261, 11, 231, 184, 215, 100, 27, 54, 51, 154, 265, 118, 298, 115, 123, 44, 289, 148, 200, 236, 63, 190, 295, 15, 196, 224, 214, 206, 168, 199, 146, 252, 167, 97, 264, 128, 205, 72, 156, 127, 225, 65, 263, 18, 232, 230, 186, 246, 172, 153, 137, 17, 281, 92, 19, 221, 260, 25, 8, 28, 180, 159, 197, 268, 12, 94, 106, 24, 76, 125, 90, 210, 132, 191, 202, 77, 193, 74, 84, 255, 93, 134, 47, 207, 155, 75, 120, 175, 91, 95, 166, 229, 274, 296, 32, 208, 220, 233, 113, 107, 73, 271, 50, 240, 96, 38] | 14226 | 100 | 40s |
| Three Hundred City Full | [79, 175, 166, 275, 45, 241, 239, 235, 60, 153, 118, 268, 277, 29, 8, 253, 236, 127, 142, 9, 138, 37, 62, 57, 210, 287, 152, 101, 160, 199, 51, 1, 163, 82, 224, 136, 190, 86, 67, 21, 191, 211, 5, 106, 146, 135, 22, 266, 83, 254, 0, 149, 2, 154, 85, 30, 90, 227, 186, 200, 92, 283, 271, 128, 201, 39, 42, 6, 147, 251, 11, 173, 207, 188, 18, 55, 269, 15, 156, 195, 94, 274, 110, 109, 56, 187, 165, 139, 80, 49, 44, 209, 247, 77, 16, 203, 238, 263, 167, 264, 265, 260, 46, 72, 295, 298, 232, 182, 24, 99, 151, 124, 121, 234, 284, 84, 144, 206, 193, 296, 189, 172, 52, 256, 111, 194, 115, 75, 102, 192, 221, 164, 181, 204, 100, 215, 3, 225, 226, 228, 54, 292, 120, 150, 133, 66, 13, 280, 176, 231, 113, 168, 41, 243, 119, 28, 170, 36, 33, 95, 252, 178, 63, 93, 38, 258, 267, 97, 132, 248, 123, 285, 223, 293, 88, 162, 174, 294, 50, 299, 214, 157, 257, 73, 185, 20, 4, 32, 262, 237, 96, 47, 273, 255, 23, 184, 19, 216, 58, 171, 246, 122, 114, 69, 229, 7, 272, 276, 64, 197, 222, 25, 117, 148, 279, 103, 297, 177, 76, 161, 125, 91, 17, 10, 143, 270, 249, 250, 87, 129, 116, 196, 59, 141, 31, 291, 89, 108, 12, 137, 131, 26, 288, 205, 220, 126, 198, 112, 53, 34, 104, 105, 70, 240, 208, 233, 289, 183, 78, 244, 134, 282, 217, 81, 259, 61, 74, 107, 169, 261, 230, 286, 219, 71, 159, 145, 242, 155, 278, 27, 281, 98, 68, 245, 40, 202, 158, 213, 43, 140, 130, 212, 48, 14, 35, 65, 218, 290, 180, 179, 79] | 13121 | 1000 | 4m |
| Thirty City Sparse | Failed | --- | 1000 |  |
| Thirty City Sparse | [3, 0, 18, 11, 19, 26, 23, 20, 17, 28, 15, 8, 22, 14, 7, 5, 27, 24, 21, 25, 29, 6, 10, 12, 1, 9, 2, 13, 4, 16, 3] | 1405 | 10000 | 1.75m |
| Thirty City Sparse | [9, 24, 21, 3, 0, 18, 11, 19, 22, 25, 29, 6, 10, 12, 1, 16, 4, 14, 7, 5, 27, 26, 23, 13, 2, 8, 15, 28, 17, 20, 9] | 1378 | 10000 | 1.75m |
| Thirty City Sparse | [8, 15, 28, 17, 20, 23, 26, 27, 5, 7, 3, 0, 18, 11, 19, 22, 14, 4, 16, 1, 12, 10, 6, 29, 25, 21, 24, 9, 2, 13, 8] | 1369 | 10000 | 1.75m |
| Hundred City Sparse | Failed | --- | 1000 |  |
| Hundred City Sparse | Failed | --- | 10000 |  |