ECM2423 - Artificial Intelligence and Applications

Continuous Assessment

How to run the code?

For this continuous assessment, I will be using Python as my programming language of choice.

Dependencies: time, itertools, random. All of these should be installed by default.

"dfs.py" and "bfs.py" are the solutions to questions 1.2 and 1.3. "a-star.py" and "maze-generator.py" are additional research and experimentation. "dfs.py", "bfs.py" and "maze-generator.py" all come with an interface complete with prompts, instructions and help to navigate them. Please note that the functionality included within these programs extends beyond what is expected to answer the questions, which necessitates the requirement for a high level of interactivity with the programs. Simply running the programs by double clicking on them, through terminal or through IDE all work perfectly fine. Follow the instructions on-screen and you will be able to run the algorithms, conduct analysis and create mazes with these programs.

Question 1.1

A search problem is a problem with some start state, goal state and some state space (search space). These problems can be represented as graphs, with nodes and edges. Solving a search problem is then formulated as finding a path, from one node to another. A maze can be framed as a search problem quite intuitively – the cells (spaces) in a maze can be represented as nodes, and adjacent spaces can be connected with arcs. If an arc exists between two nodes (spaces), one can traverse between them. From here, we simply need to search for the goal (end of the maze) from the start.

Question 1.2:

- 1. Depth-first search (DFS) is an uninformed searching algorithm for graph (and tree) data structures. It makes use of a stack and a visited list. It involves starting at some root node, and travelling as far as it can down some branch, before backtracking. The stack is required to enable the backtracking. DFS does not guarantee the shortest path from the root node to the target node.
- **2.** (See code: dfs.py)

Solution for maze-Easy.txt (with DFS):

```
[(0, 1), (1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6), (1, 7), (1, 8), (1, 9), (1, 10), (1, 11), (1, 12), (1, 13), (1, 14), (1, 15), (2, 15), (3, 15), (4, 15), (5, 15), (6, 15), (6, 16), (6, 17), (7, 17), (8, 17), (8, 18), (9, 18)]
```

3. (See code: dfs.py)

Statistics for maze-Easy.txt (with DFS):

- --- Number of nodes explored: 35 nodes ---
- --- Execution time: 0.0009951591491699219 seconds ---
- --- Number of nodes in path: 27 nodes ---

4. (See code: dfs.py) Solution for maze-Medium.txt (with DFS): [Not included here; too large. Please see "maze solutions" towards bottom of document.] Statistics for maze-Medium.txt (with DFS): --- Number of nodes explored: 549 nodes ------ Execution time: 0.0039904117584228516 seconds ------ Number of nodes in path: 321 nodes ---Solution for maze-Large.txt (with DFS): [Not included here; too large. Please see "maze solutions" towards bottom of document.] Statistics for maze-Large.txt (with DFS): --- Number of nodes explored: 10303 nodes ------ Execution time: 0.06483006477355957 seconds ------ Number of nodes in path: 1092 nodes ---Solution for maze-VLarge.txt (with DFS): [Not included here; too large. Please see "maze solutions" towards bottom of document.] Statistics for maze-VLarge.txt (with DFS): --- Number of nodes explored: 87795 nodes ------ Execution time: 0.6392557621002197 seconds ---

Analysis: DFS is extremely fast and extremely efficient in nature. It rapidly solves even the largest maze, and does so with an extremely efficient solution, thanks to some optimisation steps I have taken (see "further experimentation"). It will be very difficult to produce an algorithm with faster performance than this, and I should look instead to optimise other characteristics.

Question 1.3:

--- Number of nodes in path: 3691 nodes ---

1. I had managed to develop an extremely fast algorithm in DFS; 0.6 seconds for the largest maze is exceptional. There isn't much point in looking to build a faster algorithm; I looked to build one which finds the optimal solutions for mazes. I considered A* (see "further experimentation") but settled on breadth-first search (BFS), because it guarantees optimality and completeness, which DFS doesn't. I chose BFS over A* because A* has a higher space complexity and becomes impractical for large mazes

```
2. (See code: bfs.py)
Solution for maze-Easy.txt (with BFS):
[(0, 1), (1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (2, 5), (3, 5), (4, 5), (5, 5), (5, 6), (5, 7), (5, 8), (6, 8), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6, 9), (6,
10), (6, 11), (6, 12), (6, 13), (6, 14), (6, 15), (6, 16), (6, 17), (7, 17), (8, 17), (8, 18), (9, 18)]
Statistics for maze-Easy.txt (with BFS):
--- Number of nodes explored: 76 nodes ---
--- Execution time: 0.0009968280792236328 seconds ---
--- Number of nodes in path: 27 nodes ---
Analysis: Extremely fast, rivalling DFS in timing, while also guaranteeing optimal solution. Also, more
space efficient, exploring 8 less nodes than DFS did. Overall, a complete success.
3.
Solution for maze-Medium.txt (with BFS):
[Not included here; too large. Please see "maze solutions" towards bottom of document.]
Statistics for maze-Medium.txt (with BFS):
--- Number of nodes explored: 8477 nodes ---
--- Execution time: 0.03950142860412598 seconds ---
--- Number of nodes in path: 321 nodes ---
Solution for maze-Large.txt (with BFS):
[Not included here; too large. Please see "maze solutions" towards bottom of document.]
Statistics for maze-Large.txt (with BFS):
--- Number of nodes explored: 81993 nodes ---
--- Execution time: 0.5421068668365479 seconds ---
--- Number of nodes in path: 974 nodes ---
Solution for maze-VLarge.txt (with BFS):
[Not included here; too large. Please see "maze solutions" towards bottom of document.]
Statistics for maze-VLarge.txt (with BFS):
--- Number of nodes explored: 796575 nodes ---
--- Execution time: 36.48565626144409 seconds ---
--- Number of nodes in path: 3691 nodes ---
```

Analysis: Not as space-efficient as DFS for these mazes, but still rivalling in terms of time (apart from for the largest maze), with sub-second timings for the medium and large mazes. Still providing the most optimal solution possible for all mazes. For the largest maze, the performance hit is expected, but still completed running within 1 minute. Overall, good performance.

4. BFS found the optimal solution to all the mazes, and within reasonable time (< 60 seconds). With the exception of the largest maze, it also performed at a speed comparable to that of DFS, with subsecond times for 3 out of the 4 mazes. The performance detriment on the largest maze is to be expected, but BFS still completed well within reasonable limits, showing the solution is amenable to large mazes. Curiously, DFS has found the most optimal path from the start to the goal on a few of the mazes. This is due to optimisation I have applied to make the algorithm more efficient for the four mazes (see "further experimentation"). Although DFS has found the optimal solution for these 3 mazes, it isn't guaranteed to do so for other mazes, and this is where BFS is useful. Between the rapid DFS and optimal BFS, we have a powerful set of tools to solve mazes.

Further experimentation

A* algorithm

I conducted some extensive further experimentation, research, and analysis to supplement my work, improve efficiency, learn more about the mazes and for my own enjoyment.

While trying to decide which algorithm to use for question 1.3, I decided to experiment first with the A* algorithm. The code featured in the directory does **NOT BELONG TO ME**, and is only included for the purpose of completeness. You can find the source here:

https://medium.com/@nicholas.w.swift/easy-a-star-pathfinding-7e6689c7f7b2.

I adapted and added my own functions to this code for compatibility purposes. The main reason why I chose to adapt this code and experiment with it was to decide if A* was appropriate for the larger mazes. Ultimately, my suspicions and research were confirmed – A* does not perform well at all for larger mazes. A* is quite similar to Dijkstra's algorithm, except with a heuristic and a specific goal, rather than having every node as a goal. Admittedly, space efficiency was not at the forefront of my concerns, but is definitely another downside of A*. Because of this, I opted to go for breadth-first search instead. It is simpler to understand, explain and implement, and can be optimised similarly to DFS. It is also complete and guarantees optimality.

Optimising DFS and BFS

In the early stages of implementing DFS, I found that it ran unacceptably slow, particularly for the larger mazes, with an estimated runtime of about 6 hours for the largest maze provided. I managed to cut this down to sub-second times simply by eliminating any linear searching over any maze-dependent data structures; my initial implementation had many of these, causing huge detriments to the performance. As well as eliminating linear searches, I made use of a set for the "visited" structure, largely due to the rapid speed of membership checking operations (due to hash tables).

With my function "find_neighbours", I found that the order in which neighbours are discovered (and returned in the list to the main DFS method) has a major impact on the algorithm performance. Neighbours can be in four possible directions – up, down, left, or right. This means that there are 24 possible orders in which the neighbours can be discovered (calculated from permutations of four objects: 4!), all of which slightly impact the algorithm performance, for better or for worse. Because of this, I decided to write a new function, "dfs_analysis", that tests and evaluates the performance of every single permutation of "up", "down", "left", "right" for a maze, and gives statistics for each permutation. My program can also show the user which permutations performed best and worst in which categories. This analysis not only allows for optimisation of DFS for specific mazes, but also reveals insights into the mazes themselves, such as biases and characteristics, as well as reflecting on the algorithms that built them. For the four supplied mazes, I built their most optimal permutations into the "default" option of the program – these are the results displayed in this document as answers to questions 1.2 and 1.3. (This is why some of the DFS answers miraculously have also managed to obtain the shortest path, as well as being extremely fast and efficient – they have been optimised for their exact mazes, by selecting the best permutation.)

I carried over the same ideas to my BFS implementation, although it can be argued that the effects on BFS are rather strange and unexpected. All solutions generated by BFS are guaranteed to be optimal, which means that all paths produced will likely be identical. However, optimising BFS comes in the form of improving time taken and reducing nodes explored. I was quite surprised to discover that the configuration of neighbour discovery mattered quite a lot for the time efficiency of BFS – certain permutations would run over twice as slow as others. Again, I optimised each BFS configuration for each maze, but I also found that in general, BFS was significantly less consistent, even when applying the same configuration on the same maze, the time may vary quite a lot.

The main limitation of this idea is that the permutation cannot be changed during runtime; if it were possible, it could be used to even further improve performance, especially on larger mazes. However, I felt that second-order neighbour discovery configuration (and all subsequent) would be needlessly complicated and require a major refactoring of the rest of the algorithm and, given the already excellent performance of DFS and BFS, not worth it at all.

Maze generation

A few years ago, during my time in sixth form, I created a program to generate mazes as part of a larger project. The program is limited in the sense that it can only generate square mazes (where the width and height are the same), but nonetheless I decided to include it as part of my extra research, by adapting it to match the formatting outlined by the specification and allowing it to write mazes to files to be tested. I have included a few mazes in this submission that have been generated by this algorithm, as well as the algorithm itself (again, for completeness purposes). "bigMaze.txt" is a 1001 by 1001 maze; "mediumMaze.txt" is a 101 by 101 maze, and "smallMaze.txt" is a 11 by 11 maze. I also included elements of the DFS module for testing purposes, to ensure that all mazes generated are solvable. I used this maze generation algorithm to further test my algorithms too, as well as for analytics and insight into the generation algorithm (biases, patterns, etc.).

User interaction

"dfs.py", "bfs.py", "maze_generator.py" all feature user prompts and interaction from shell in order to convey information to the user. I added this in to allow the user to easily and unambiguously experience the full range of tools I have provided – the algorithms, the configuration tools, the analysis tools and the maze generation algorithm. I have done my best to ensure that false inputs are appropriately handled and denied, but if any bugs are discovered, please do contact me.

The user can supply the algorithms any maze they wish, but mazes that are found to be unsolvable are rejected with a message. The user is also allowed to customise the configuration for looking for neighbours – this should be entered (at the relevant menu) with only the four directions, first letter capitalized, sitting within single quotes, and comma separated. Do not include brackets.

An option is also included to give extra information, in case the user is lost or confused by the options provided.

Maze solutions

Solution for maze-Medium.txt (with DFS):

```
[(0, 1), (1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6), (1, 7), (1, 8), (1, 9), (2, 9), (3, 9), (3, 10), (3, 11), (4, 11),
(5, 11), (5, 12), (5, 13), (5, 14), (6, 14), (7, 14), (8, 14), (9, 14), (10, 14), (11, 14), (12, 14), (13, 14), (14,
14), (14, 15), (14, 16), (14, 17), (15, 17), (16, 17), (17, 17), (18, 17), (19, 17), (20, 17), (21, 17), (21, 18),
(21, 19), (21, 20), (21, 21), (21, 22), (22, 22), (23, 22), (24, 22), (25, 22), (25, 23), (25, 24), (25, 25), (26,
25), (26, 26), (27, 26), (28, 26), (29, 26), (30, 26), (31, 26), (32, 26), (32, 27), (32, 28), (33, 28), (33, 29),
(33, 30), (34, 30), (34, 31), (34, 32), (34, 33), (34, 34), (35, 34), (35, 35), (35, 36), (35, 37), (34, 37), (34,
38), (34, 39), (34, 40), (34, 41), (35, 41), (35, 42), (35, 43), (35, 44), (35, 45), (35, 46), (36, 46), (36, 47),
(37, 47), (38, 47), (39, 47), (39, 48), (39, 49), (38, 49), (38, 50), (38, 51), (38, 52), (38, 53), (38, 54), (38, 54), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38, 58), (38,
55), (38, 56), (38, 57), (39, 57), (39, 58), (40, 58), (41, 58), (42, 58), (42, 59), (42, 60), (43, 60), (43, 61),
(44, 61), (45, 61), (46, 61), (47, 61), (47, 62), (48, 62), (49, 62), (49, 63), (49, 64), (49, 65), (50, 65), (51,
65), (51, 66), (52, 66), (52, 67), (52, 68), (52, 69), (53, 69), (53, 70), (54, 70), (55, 70), (56, 70), (57, 70),
(58, 70), (58, 71), (58, 72), (58, 73), (58, 74), (58, 75), (58, 76), (58, 77), (59, 77), (60, 77), (61, 77), (61,
78), (61, 79), (61, 80), (61, 81), (61, 82), (62, 82), (63, 82), (63, 83), (64, 83), (65, 83), (65, 84), (65, 85),
(65, 86), (65, 87), (65, 88), (65, 89), (66, 89), (67, 89), (67, 90), (68, 90), (68, 91), (69, 91), (69, 92), (70,
92), (71, 92), (71, 93), (72, 93), (73, 93), (73, 92), (74, 92), (75, 92), (75, 93), (76, 93), (76, 94), (76, 95),
(76, 96), (76, 97), (77, 97), (77, 98), (78, 98), (78, 99), (79, 99), (80, 99), (80, 100), (80, 101), (80, 102),
(81, 102), (81, 103), (81, 104), (81, 105), (81, 106), (81, 107), (82, 107), (82, 108), (82, 109), (82, 110),
(83, 110), (84, 110), (84, 111), (85, 111), (86, 111), (86, 112), (86, 113), (85, 113), (85, 114), (85, 115),
(85, 116), (85, 117), (85, 118), (85, 119), (85, 120), (85, 121), (86, 121), (87, 121), (87, 122), (87, 123),
(87, 124), (88, 124), (89, 124), (90, 124), (90, 125), (91, 125), (91, 126), (91, 127), (91, 128), (91, 129),
(91, 130), (91, 131), (92, 131), (92, 132), (92, 133), (92, 134), (92, 135), (93, 135), (93, 136), (93, 137),
(92, 137), (91, 137), (91, 138), (91, 139), (90, 139), (90, 140), (90, 141), (90, 142), (90, 143), (91, 143),
(91, 144), (91, 145), (92, 145), (93, 145), (94, 145), (94, 146), (94, 147), (95, 147), (95, 148), (95, 149),
(95, 150), (94, 150), (94, 151), (94, 152), (93, 152), (93, 153), (93, 154), (93, 155), (93, 156), (92, 156),
(92, 157), (92, 158), (92, 159), (92, 160), (92, 161), (92, 162), (92, 163), (92, 164), (92, 165), (92, 166),
(92, 167), (92, 168), (92, 169), (92, 170), (92, 171), (92, 172), (92, 173), (92, 174), (92, 175), (92, 176),
(92, 177), (92, 178), (92, 179), (92, 180), (92, 181), (92, 182), (93, 182), (94, 182), (95, 182), (96, 182),
(96, 183), (96, 184), (96, 185), (96, 186), (95, 186), (95, 187), (95, 188), (95, 189), (95, 190), (96, 190),
(96, 191), (96, 192), (95, 192), (95, 193), (95, 194), (95, 195), (95, 196), (95, 197), (95, 198), (96, 198),
(97, 198), (98, 198), (99, 198)]
```

Solution for maze-Large.txt (with DFS):

```
[(0, 1), (1, 1), (2, 1), (3, 1), (4, 1), (4, 2), (5, 2), (6, 2), (7, 2), (8, 2), (8, 3), (9, 3), (10, 3), (10, 4), (10, 5),
(10, 6), (11, 6), (11, 7), (12, 7), (13, 7), (14, 7), (15, 7), (16, 7), (16, 8), (16, 9), (16, 10), (16, 11), (17,
11), (18, 11), (18, 12), (19, 12), (20, 12), (20, 13), (20, 14), (20, 15), (20, 16), (20, 17), (21, 17), (22, 17),
(22, 18), (22, 19), (23, 19), (24, 19), (25, 19), (25, 20), (25, 21), (26, 21), (27, 21), (28, 21), (29, 21), (29,
22), (30, 22), (31, 22), (32, 22), (33, 22), (34, 22), (34, 23), (35, 23), (36, 23), (37, 23), (37, 24), (37, 25),
(37, 26), (37, 27), (37, 28), (37, 29), (37, 30), (37, 31), (37, 32), (37, 33), (37, 34), (37, 35), (37, 36), (37, 37), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37, 38), (37,
37), (37, 38), (37, 39), (36, 39), (35, 39), (35, 40), (35, 41), (35, 42), (36, 42), (37, 42), (37, 43), (37, 44),
(37, 45), (36, 45), (36, 46), (36, 47), (37, 47), (37, 48), (37, 49), (37, 50), (38, 50), (39, 50), (40, 50), (40, 50)
51), (40, 52), (41, 52), (42, 52), (43, 52), (43, 53), (43, 54), (43, 55), (43, 56), (44, 56), (45, 56), (45, 57),
(45, 58), (45, 59), (46, 59), (47, 59), (48, 59), (49, 59), (50, 59), (51, 59), (51, 60), (51, 61), (51, 62), (52,
62), (52, 63), (52, 64), (52, 65), (52, 66), (52, 67), (52, 68), (52, 69), (52, 70), (51, 70), (50, 70), (50, 71),
(50, 72), (51, 72), (51, 73), (52, 73), (52, 74), (52, 75), (52, 76), (53, 76), (53, 77), (53, 78), (53, 79), (53, 78)
80), (53, 81), (54, 81), (54, 82), (54, 83), (54, 84), (54, 85), (55, 85), (55, 86), (56, 86), (57, 86), (58, 86),
(58, 87), (58, 88), (58, 89), (58, 90), (58, 91), (58, 92), (58, 93), (58, 94), (58, 95), (58, 96), (59, 96), (60,
96), (61, 96), (61, 97), (62, 97), (63, 97), (64, 97), (65, 97), (65, 98), (65, 99), (65, 100), (65, 101), (66,
101), (66, 102), (66, 103), (66, 104), (66, 105), (66, 106), (67, 106), (67, 107), (68, 107), (69, 107), (70,
107), (70, 108), (70, 109), (70, 110), (70, 111), (70, 112), (70, 113), (71, 113), (72, 113), (73, 113), (73,
114), (73, 115), (73, 116), (73, 117), (73, 118), (74, 118), (74, 119), (74, 120), (74, 121), (75, 121), (76,
121), (77, 121), (77, 122), (77, 123), (76, 123), (76, 124), (76, 125), (76, 126), (77, 126), (78, 126), (78,
127), (79, 127), (80, 127), (80, 126), (80, 125), (80, 124), (80, 123), (80, 122), (81, 122), (82, 122), (83,
122), (83, 123), (84, 123), (85, 123), (86, 123), (86, 122), (86, 121), (87, 121), (88, 121), (89, 121), (90,
121), (91, 121), (92, 121), (93, 121), (94, 121), (94, 120), (94, 119), (94, 118), (95, 118), (96, 118), (97,
118), (98, 118), (99, 118), (100, 118), (100, 117), (101, 117), (102, 117), (102, 116), (102, 115), (102,
114), (103, 114), (104, 114), (104, 113), (105, 113), (106, 113), (106, 114), (107, 114), (108, 114),
(109, 114), (109, 113), (110, 113), (111, 113), (112, 113), (113, 113), (114, 113), (115, 113), (116,
113), (116, 112), (116, 111), (116, 110), (116, 109), (117, 109), (118, 109), (118, 108), (118, 107),
(118, 106), (118, 105), (118, 104), (119, 104), (120, 104), (120, 103), (120, 102), (121, 102), (122,
102), (122, 101), (123, 101), (124, 101), (125, 101), (126, 101), (126, 100), (127, 100), (128, 100),
(128, 99), (129, 99), (129, 98), (129, 97), (129, 96), (130, 96), (130, 95), (131, 95), (132, 95), (133, 95),
(134, 95), (135, 95), (135, 96), (136, 96), (137, 96), (138, 96), (139, 96), (139, 95), (140, 95), (141, 95),
(142, 95), (143, 95), (143, 94), (143, 93), (143, 92), (144, 92), (145, 92), (146, 92), (147, 92), (148, 92),
(149, 92), (150, 92), (151, 92), (152, 92), (152, 91), (152, 90), (152, 89), (152, 88), (153, 88), (153, 87),
(153, 86), (153, 85), (153, 84), (154, 84), (155, 84), (156, 84), (157, 84), (157, 83), (157, 82), (158, 82),
(159, 82), (160, 82), (161, 82), (162, 82), (163, 82), (164, 82), (165, 82), (165, 81), (166, 81), (166, 80),
(167, 80), (167, 79), (168, 79), (169, 79), (169, 78), (169, 77), (170, 77), (171, 77), (172, 77), (173, 77),
(174, 77), (174, 76), (175, 76), (176, 76), (176, 75), (177, 75), (178, 75), (179, 75), (179, 76), (180, 76),
(181, 76), (182, 76), (183, 76), (184, 76), (185, 76), (186, 76), (186, 75), (187, 75), (188, 75), (189, 75),
(190, 75), (191, 75), (192, 75), (193, 75), (194, 75), (195, 75), (196, 75), (197, 75), (198, 75), (199, 75),
(200, 75), (200, 76), (201, 76), (201, 77), (201, 78), (202, 78), (203, 78), (204, 78), (205, 78), (206, 78),
(207, 78), (208, 78), (209, 78), (209, 79), (210, 79), (211, 79), (212, 79), (213, 79), (214, 79), (215, 79),
(216, 79), (217, 79), (217, 78), (217, 77), (217, 76), (217, 75), (217, 74), (217, 73), (217, 72), (218, 72),
(219, 72), (219, 71), (219, 70), (220, 70), (221, 70), (222, 70), (223, 70), (224, 70), (225, 70), (226, 70),
(226, 69), (227, 69), (227, 68), (227, 67), (228, 67), (229, 67), (230, 67), (230, 66), (231, 66), (231, 65),
```

```
(231, 64), (232, 64), (232, 63), (233, 63), (234, 63), (234, 62), (234, 61), (234, 60), (234, 59), (234, 58),
(235, 58), (236, 58), (237, 58), (237, 57), (238, 57), (239, 57), (239, 56), (239, 55), (239, 54), (239, 53),
(240, 53), (241, 53), (242, 53), (242, 52), (243, 52), (244, 52), (245, 52), (246, 52), (246, 51), (247, 51),
(247, 50), (248, 50), (249, 50), (250, 50), (251, 50), (252, 50), (253, 50), (254, 50), (254, 51), (255, 51),
(256, 51), (256, 50), (256, 49), (257, 49), (257, 48), (258, 48), (259, 48), (260, 48), (261, 48), (262, 48),
(262, 47), (262, 46), (263, 46), (264, 46), (265, 46), (265, 45), (266, 45), (267, 45), (268, 45), (269, 45),
(270, 45), (270, 44), (270, 43), (271, 43), (271, 42), (271, 41), (272, 41), (272, 40), (273, 40), (274, 40),
(275, 40), (275, 39), (275, 38), (275, 37), (276, 37), (276, 36), (276, 35), (277, 35), (278, 35), (278, 34),
(279, 34), (280, 34), (280, 33), (280, 32), (281, 32), (281, 31), (281, 30), (282, 30), (283, 30), (283, 29),
(284, 29), (285, 29), (285, 28), (286, 28), (287, 28), (287, 27), (287, 26), (287, 25), (287, 24), (288, 24),
(289, 24), (290, 24), (291, 24), (292, 24), (293, 24), (294, 24), (294, 23), (295, 23), (296, 23), (297, 23),
(297, 22), (297, 21), (298, 21), (298, 20), (299, 20), (300, 20), (301, 20), (302, 20), (302, 19), (303, 19),
(304, 19), (305, 19), (306, 19), (307, 19), (308, 19), (309, 19), (310, 19), (311, 19), (311, 18), (311, 17),
(312, 17), (313, 17), (314, 17), (315, 17), (315, 16), (315, 15), (315, 14), (315, 13), (316, 13), (317, 13),
(318, 13), (319, 13), (319, 12), (320, 12), (321, 12), (321, 11), (322, 11), (323, 11), (324, 11), (325, 11),
(326, 11), (326, 10), (327, 10), (328, 10), (328, 9), (328, 8), (328, 7), (329, 7), (330, 7), (331, 7), (332, 7), (330, 7), (330, 7), (331, 7), (332, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), (330, 7), 
7), (333, 7), (334, 7), (335, 7), (336, 7), (337, 7), (338, 7), (339, 7), (340, 7), (341, 7), (341, 8), (341, 9),
(342, 9), (342, 10), (343, 10), (344, 10), (344, 11), (344, 12), (345, 12), (346, 12), (347, 12), (348, 12),
(348, 11), (348, 10), (348, 9), (348, 8), (348, 7), (349, 7), (350, 7), (350, 6), (350, 5), (351, 5), (352, 5),
(352, 4), (353, 4), (354, 4), (354, 5), (355, 5), (356, 5), (356, 6), (356, 7), (357, 7), (357, 8), (358, 8),
(359, 8), (359, 7), (359, 6), (360, 6), (361, 6), (362, 6), (363, 6), (364, 6), (365, 6), (366, 6), (367, 6),
(368, 6), (369, 6), (370, 6), (370, 5), (370, 4), (371, 4), (372, 4), (372, 3), (372, 2), (372, 1), (373, 1),
(374, 1), (375, 1), (375, 2), (375, 3), (376, 3), (377, 3), (377, 4), (378, 4), (379, 4), (380, 4), (381, 4),
(381, 5), (382, 5), (383, 5), (383, 4), (383, 3), (383, 2), (384, 2), (385, 2), (386, 2), (387, 2), (388, 2),
(388, 3), (388, 4), (389, 4), (390, 4), (391, 4), (392, 4), (393, 4), (394, 4), (394, 5), (395, 5), (395, 6),
(395, 7), (395, 8), (396, 8), (396, 9), (396, 10), (396, 11), (397, 11), (398, 11), (399, 11), (400, 11), (400,
12), (401, 12), (401, 13), (402, 13), (403, 13), (404, 13), (405, 13), (406, 13), (406, 14), (406, 15), (406,
16), (406, 17), (406, 18), (406, 19), (405, 19), (404, 19), (403, 19), (402, 19), (402, 18), (401, 18), (400,
18), (399, 18), (399, 19), (398, 19), (397, 19), (396, 19), (395, 19), (394, 19), (394, 20), (393, 20), (392,
20), (392, 21), (392, 22), (391, 22), (391, 23), (391, 24), (391, 25), (390, 25), (390, 26), (390, 27), (389,
27), (389, 28), (389, 29), (390, 29), (390, 30), (391, 30), (392, 30), (392, 31), (393, 31), (393, 32), (393,
33), (393, 34), (394, 34), (394, 35), (394, 36), (393, 36), (393, 37), (393, 38), (393, 39), (393, 40), (393,
41), (392, 41), (391, 41), (390, 41), (390, 42), (390, 43), (390, 44), (389, 44), (389, 45), (389, 46), (388,
46), (387, 46), (386, 46), (385, 46), (385, 47), (385, 48), (385, 49), (385, 50), (386, 50), (387, 50), (388,
50), (389, 50), (390, 50), (391, 50), (392, 50), (393, 50), (394, 50), (395, 50), (396, 50), (397, 50), (398,
50), (398, 49), (399, 49), (400, 49), (401, 49), (402, 49), (403, 49), (404, 49), (404, 48), (405, 48), (406,
48), (407, 48), (408, 48), (409, 48), (409, 49), (409, 50), (409, 51), (410, 51), (411, 51), (411, 52), (411,
53), (412, 53), (412, 54), (413, 54), (414, 54), (414, 55), (415, 55), (416, 55), (416, 56), (417, 56), (418,
56), (419, 56), (420, 56), (421, 56), (421, 55), (421, 54), (421, 53), (422, 53), (423, 53), (424, 53), (425,
53), (426, 53), (426, 52), (427, 52), (428, 52), (428, 53), (429, 53), (430, 53), (431, 53), (432, 53), (432,
52), (433, 52), (434, 52), (435, 52), (435, 53), (436, 53), (437, 53), (437, 52), (437, 51), (438, 51), (438,
50), (439, 50), (439, 49), (440, 49), (441, 49), (442, 49), (443, 49), (444, 49), (444, 48), (445, 48), (446,
48), (447, 48), (448, 48), (449, 48), (450, 48), (450, 47), (451, 47), (452, 47), (452, 46), (453, 46), (454,
46), (454, 45), (455, 45), (456, 45), (457, 45), (457, 44), (457, 43), (457, 42), (457, 41), (457, 40), (458,
40), (458, 39), (459, 39), (460, 39), (461, 39), (462, 39), (463, 39), (464, 39), (464, 38), (465, 38), (466,
38), (467, 38), (468, 38), (469, 38), (469, 39), (470, 39), (471, 39), (471, 40), (471, 41), (472, 41), (473,
41), (474, 41), (474, 42), (475, 42), (476, 42), (477, 42), (478, 42), (479, 42), (480, 42), (481, 42), (482,
42), (483, 42), (484, 42), (484, 41), (485, 41), (486, 41), (487, 41), (488, 41), (489, 41), (490, 41), (491,
```

```
41), (492, 41), (493, 41), (494, 41), (495, 41), (496, 41), (497, 41), (498, 41), (499, 41), (500, 41), (501,
41), (502, 41), (503, 41), (504, 41), (504, 40), (505, 40), (506, 40), (507, 40), (508, 40), (509, 40), (509,
41), (510, 41), (511, 41), (511, 40), (511, 39), (512, 39), (513, 39), (513, 38), (513, 37), (514, 37), (515,
37), (516, 37), (517, 37), (517, 36), (518, 36), (519, 36), (520, 36), (520, 37), (520, 38), (520, 39), (521,
39), (522, 39), (523, 39), (524, 39), (525, 39), (526, 39), (527, 39), (528, 39), (529, 39), (530, 39), (531,
39), (532, 39), (532, 40), (532, 41), (533, 41), (534, 41), (534, 42), (534, 43), (535, 43), (535, 44), (536,
44), (537, 44), (538, 44), (539, 44), (539, 45), (539, 46), (540, 46), (541, 46), (542, 46), (543, 46), (544,
46), (544, 45), (545, 45), (545, 44), (546, 44), (547, 44), (547, 45), (548, 45), (549, 45), (550, 45), (551,
45), (551, 46), (551, 47), (551, 48), (552, 48), (553, 48), (553, 49), (554, 49), (555, 49), (556, 49), (556,
50), (557, 50), (557, 51), (558, 51), (558, 52), (559, 52), (560, 52), (561, 52), (562, 52), (563, 52), (563,
51), (563, 50), (563, 49), (564, 49), (565, 49), (566, 49), (567, 49), (568, 49), (568, 48), (569, 48), (570,
48), (571, 48), (572, 48), (573, 48), (574, 48), (575, 48), (576, 48), (577, 48), (578, 48), (578, 49), (578,
50), (578, 51), (579, 51), (580, 51), (581, 51), (581, 50), (582, 50), (583, 50), (584, 50), (585, 50), (585,
51), (586, 51), (586, 52), (587, 52), (588, 52), (589, 52), (589, 51), (590, 51), (591, 51), (591, 52), (591,
53), (591, 54), (591, 55), (591, 56), (591, 57), (592, 57), (593, 57), (594, 57), (595, 57), (595, 58), (595,
59), (596, 59), (597, 59), (598, 59), (599, 59)]
```

Solution for maze-VLarge.txt (with DFS):

```
[(0, 1), (1, 1), (2, 1), (3, 1), (4, 1), (5, 1), (6, 1), (7, 1), (7, 2), (8, 2), (9, 2), (10, 2), (11, 2), (12, 2), (12, 3),
(12, 4), (12, 5), (12, 6), (13, 6), (14, 6), (15, 6), (16, 6), (16, 5), (17, 5), (17, 4), (18, 4), (19, 4), (19, 5),
(20, 5), (21, 5), (21, 4), (22, 4), (23, 4), (24, 4), (24, 3), (25, 3), (26, 3), (26, 2), (26, 1), (27, 1), (28, 1),
(28, 2), (29, 2), (29, 3), (30, 3), (31, 3), (32, 3), (33, 3), (34, 3), (35, 3), (36, 3), (37, 3), (38, 3), (38, 2),
(39, 2), (40, 2), (41, 2), (42, 2), (43, 2), (44, 2), (45, 2), (45, 1), (46, 1), (47, 1), (47, 2), (48, 2), (49, 2),
(50, 2), (51, 2), (51, 3), (51, 4), (52, 4), (53, 4), (53, 3), (54, 3), (55, 3), (56, 3), (57, 3), (58, 3), (58, 4),
(58, 5), (58, 6), (58, 7), (59, 7), (60, 7), (60, 6), (61, 6), (62, 6), (62, 7), (63, 7), (64, 7), (65, 7), (66, 7),
(67, 7), (68, 7), (69, 7), (70, 7), (71, 7), (72, 7), (73, 7), (74, 7), (75, 7), (75, 6), (76, 6), (77, 6), (78, 6),
(79, 6), (79, 5), (80, 5), (80, 4), (80, 3), (80, 2), (81, 2), (82, 2), (83, 2), (84, 2), (84, 3), (85, 3), (86, 3),
(87, 3), (88, 3), (89, 3), (89, 4), (90, 4), (91, 4), (91, 5), (92, 5), (93, 5), (93, 6), (93, 7), (93, 8), (93, 9),
(93, 10), (94, 10), (95, 10), (95, 11), (95, 12), (96, 12), (97, 12), (97, 13), (97, 14), (98, 14), (99, 14),
(100, 14), (101, 14), (102, 14), (102, 15), (103, 15), (104, 15), (104, 16), (105, 16), (105, 17), (106, 17),
(107, 17), (108, 17), (109, 17), (110, 17), (111, 17), (111, 18), (112, 18), (113, 18), (114, 18), (114, 19),
(115, 19), (115, 20), (115, 21), (115, 22), (115, 23), (116, 23), (117, 23), (117, 24), (117, 25), (118, 25),
(119, 25), (120, 25), (121, 25), (121, 26), (122, 26), (123, 26), (123, 27), (124, 27), (125, 27), (125, 28),
(126, 28), (127, 28), (128, 28), (129, 28), (130, 28), (131, 28), (132, 28), (133, 28), (133, 27), (133, 26),
(134, 26), (134, 25), (135, 25), (136, 25), (137, 25), (138, 25), (139, 25), (140, 25), (141, 25), (142, 25),
(143, 25), (143, 24), (144, 24), (145, 24), (146, 24), (147, 24), (147, 25), (147, 26), (148, 26), (149, 26),
(150, 26), (150, 25), (150, 24), (151, 24), (151, 23), (152, 23), (153, 23), (154, 23), (155, 23), (156, 23),
(156, 22), (157, 22), (158, 22), (159, 22), (159, 23), (160, 23), (161, 23), (161, 22), (162, 22), (162, 21),
(163, 21), (164, 21), (164, 22), (165, 22), (166, 22), (167, 22), (167, 23), (168, 23), (169, 23), (169, 24),
(169, 25), (170, 25), (171, 25), (172, 25), (172, 24), (173, 24), (174, 24), (175, 24), (176, 24), (176, 23),
(177, 23), (178, 23), (179, 23), (180, 23), (180, 24), (180, 25), (180, 26), (181, 26), (182, 26), (183, 26),
(184, 26), (185, 26), (186, 26), (187, 26), (188, 26), (189, 26), (189, 27), (190, 27), (191, 27), (191, 28),
(192, 28), (193, 28), (194, 28), (195, 28), (196, 28), (197, 28), (198, 28), (199, 28), (200, 28), (200, 29),
(201, 29), (201, 30), (201, 31), (202, 31), (203, 31), (204, 31), (205, 31), (205, 30), (206, 30), (207, 30),
(208, 30), (208, 31), (208, 32), (209, 32), (210, 32), (210, 33), (210, 34), (210, 35), (211, 35), (212, 35),
```

```
(213, 35), (213, 36), (213, 37), (214, 37), (215, 37), (216, 37), (217, 37), (217, 36), (217, 35), (218, 35),
(219, 35), (219, 34), (219, 33), (219, 32), (220, 32), (221, 32), (222, 32), (223, 32), (223, 33), (223, 34),
(223, 35), (224, 35), (225, 35), (226, 35), (227, 35), (228, 35), (229, 35), (230, 35), (231, 35), (232, 35),
(233, 35), (234, 35), (234, 36), (235, 36), (236, 36), (237, 36), (238, 36), (238, 37), (239, 37), (240, 37),
(241, 37), (242, 37), (243, 37), (244, 37), (244, 38), (245, 38), (246, 38), (247, 38), (248, 38), (248, 37),
(248, 36), (249, 36), (250, 36), (251, 36), (251, 35), (252, 35), (253, 35), (254, 35), (255, 35), (255, 34),
(256, 34), (257, 34), (257, 33), (257, 32), (258, 32), (259, 32), (259, 33), (260, 33), (261, 33), (262, 33),
(263, 33), (263, 34), (264, 34), (265, 34), (265, 35), (266, 35), (267, 35), (268, 35), (269, 35), (269, 34),
(269, 33), (270, 33), (271, 33), (272, 33), (273, 33), (274, 33), (274, 32), (275, 32), (276, 32), (276, 33),
(276, 34), (277, 34), (278, 34), (279, 34), (280, 34), (281, 34), (281, 35), (281, 36), (282, 36), (283, 36),
(284, 36), (284, 37), (285, 37), (286, 37), (287, 37), (288, 37), (289, 37), (290, 37), (291, 37), (292, 37),
(293, 37), (293, 38), (294, 38), (294, 39), (294, 40), (295, 40), (295, 41), (296, 41), (297, 41), (298, 41),
(299, 41), (299, 40), (300, 40), (301, 40), (302, 40), (303, 40), (303, 41), (303, 42), (304, 42), (305, 42),
(306, 42), (307, 42), (307, 43), (307, 44), (308, 44), (309, 44), (310, 44), (310, 45), (310, 46), (311, 46),
(311, 47), (312, 47), (312, 48), (312, 49), (312, 50), (313, 50), (314, 50), (314, 51), (315, 51), (316, 51),
(317, 51), (317, 52), (318, 52), (319, 52), (320, 52), (321, 52), (322, 52), (322, 53), (322, 54), (323, 54),
(323, 55), (324, 55), (325, 55), (326, 55), (327, 55), (328, 55), (329, 55), (330, 55), (331, 55), (332, 55),
(332, 56), (332, 57), (332, 58), (333, 58), (334, 58), (334, 59), (334, 60), (335, 60), (336, 60), (337, 60),
(338, 60), (339, 60), (340, 60), (341, 60), (342, 60), (343, 60), (344, 60), (345, 60), (346, 60), (347, 60),
(348, 60), (349, 60), (350, 60), (351, 60), (352, 60), (352, 61), (353, 61), (354, 61), (354, 62), (354, 63),
(354, 64), (354, 65), (355, 65), (356, 65), (356, 64), (357, 64), (358, 64), (359, 64), (359, 65), (360, 65),
(361, 65), (361, 64), (362, 64), (363, 64), (363, 65), (364, 65), (365, 65), (366, 65), (366, 66), (367, 66),
(368, 66), (369, 66), (370, 66), (371, 66), (372, 66), (373, 66), (374, 66), (374, 67), (375, 67), (376, 67),
(377, 67), (377, 68), (378, 68), (379, 68), (380, 68), (380, 69), (381, 69), (382, 69), (382, 70), (382, 71),
(382, 72), (382, 73), (383, 73), (384, 73), (384, 74), (385, 74), (386, 74), (387, 74), (388, 74), (388, 75),
(389, 75), (390, 75), (391, 75), (392, 75), (393, 75), (393, 76), (393, 77), (394, 77), (395, 77), (395, 78),
(395, 79), (396, 79), (396, 80), (396, 81), (396, 82), (396, 83), (396, 84), (396, 85), (397, 85), (398, 85),
(399, 85), (400, 85), (401, 85), (401, 84), (402, 84), (403, 84), (404, 84), (405, 84), (405, 85), (406, 85),
(407, 85), (408, 85), (409, 85), (409, 86), (410, 86), (410, 87), (411, 87), (412, 87), (412, 86), (413, 86),
(413, 85), (414, 85), (415, 85), (415, 84), (415, 83), (415, 82), (416, 82), (417, 82), (418, 82), (418, 81),
(419, 81), (420, 81), (421, 81), (422, 81), (422, 80), (422, 79), (423, 79), (424, 79), (424, 80), (425, 80),
(426, 80), (427, 80), (428, 80), (429, 80), (430, 80), (431, 80), (431, 79), (432, 79), (433, 79), (433, 80),
(433, 81), (433, 82), (434, 82), (435, 82), (436, 82), (437, 82), (437, 81), (438, 81), (439, 81), (440, 81),
(441, 81), (441, 80), (441, 79), (442, 79), (442, 78), (443, 78), (444, 78), (444, 77), (444, 76), (445, 76),
(446, 76), (447, 76), (448, 76), (449, 76), (449, 77), (449, 78), (449, 79), (449, 80), (449, 81), (450, 81),
(451, 81), (452, 81), (453, 81), (453, 82), (453, 83), (453, 84), (454, 84), (455, 84), (456, 84), (457, 84),
(458, 84), (458, 83), (459, 83), (460, 83), (461, 83), (462, 83), (462, 84), (463, 84), (463, 85), (464, 85),
(464, 86), (464, 87), (464, 88), (464, 89), (465, 89), (466, 89), (467, 89), (467, 90), (467, 91), (467, 92),
(467, 93), (468, 93), (469, 93), (470, 93), (471, 93), (472, 93), (473, 93), (474, 93), (475, 93), (475, 94),
(476, 94), (477, 94), (477, 93), (478, 93), (479, 93), (480, 93), (481, 93), (481, 94), (482, 94), (483, 94),
(484, 94), (484, 95), (485, 95), (485, 96), (486, 96), (486, 97), (486, 98), (486, 99), (487, 99), (488, 99),
(489, 99), (490, 99), (491, 99), (492, 99), (493, 99), (493, 100), (494, 100), (495, 100), (496, 100), (497,
100), (498, 100), (499, 100), (499, 99), (499, 98), (500, 98), (501, 98), (502, 98), (503, 98), (504, 98),
(504, 99), (505, 99), (505, 100), (506, 100), (507, 100), (507, 99), (508, 99), (509, 99), (509, 98), (510,
98), (511, 98), (512, 98), (512, 99), (513, 99), (514, 99), (514, 100), (515, 100), (515, 101), (515, 102),
(516, 102), (517, 102), (517, 103), (517, 104), (518, 104), (519, 104), (520, 104), (521, 104), (522,
104), (523, 104), (524, 104), (524, 105), (524, 106), (525, 106), (525, 107), (526, 107), (527, 107),
(528, 107), (529, 107), (530, 107), (530, 108), (531, 108), (532, 108), (533, 108), (533, 107), (534,
```

```
107), (534, 106), (535, 106), (536, 106), (537, 106), (538, 106), (539, 106), (540, 106), (541, 106),
(542, 106), (543, 106), (544, 106), (545, 106), (546, 106), (547, 106), (548, 106), (548, 107), (549,
107), (550, 107), (550, 106), (551, 106), (552, 106), (552, 107), (553, 107), (553, 108), (554, 108),
(555, 108), (556, 108), (557, 108), (558, 108), (559, 108), (560, 108), (561, 108), (562, 108), (563,
108), (564, 108), (564, 109), (564, 110), (565, 110), (566, 110), (567, 110), (567, 111), (567, 112),
(567, 113), (568, 113), (568, 114), (568, 115), (568, 116), (569, 116), (569, 117), (570, 117), (571,
117), (571, 116), (572, 116), (573, 116), (574, 116), (575, 116), (576, 116), (577, 116), (577, 117),
(577, 118), (577, 119), (578, 119), (579, 119), (579, 120), (580, 120), (581, 120), (582, 120), (582,
121), (582, 122), (582, 123), (583, 123), (583, 124), (583, 125), (583, 126), (583, 127), (583, 128),
(582, 128), (582, 129), (582, 130), (583, 130), (584, 130), (584, 131), (584, 132), (584, 133), (585,
133), (585, 134), (586, 134), (586, 135), (586, 136), (586, 137), (586, 138), (586, 139), (587, 139),
(588, 139), (589, 139), (590, 139), (591, 139), (592, 139), (592, 138), (592, 137), (593, 137), (594,
137), (595, 137), (596, 137), (597, 137), (598, 137), (599, 137), (600, 137), (601, 137), (602, 137),
(602, 138), (603, 138), (604, 138), (605, 138), (606, 138), (607, 138), (608, 138), (608, 139), (608,
140), (609, 140), (610, 140), (611, 140), (611, 141), (611, 142), (612, 142), (613, 142), (614, 142),
(615, 142), (615, 143), (616, 143), (616, 144), (617, 144), (618, 144), (619, 144), (619, 145), (619,
146), (620, 146), (621, 146), (621, 147), (622, 147), (622, 148), (623, 148), (623, 149), (623, 150),
(624, 150), (625, 150), (626, 150), (627, 150), (628, 150), (628, 151), (628, 152), (629, 152), (630,
152), (630, 153), (630, 154), (631, 154), (631, 155), (631, 156), (632, 156), (633, 156), (633, 157),
(634, 157), (635, 157), (635, 158), (636, 158), (637, 158), (638, 158), (639, 158), (639, 159), (640,
159), (640, 160), (641, 160), (642, 160), (643, 160), (644, 160), (645, 160), (646, 160), (647, 160),
(647, 161), (648, 161), (649, 161), (650, 161), (651, 161), (652, 161), (653, 161), (654, 161), (654,
160), (655, 160), (656, 160), (657, 160), (657, 161), (657, 162), (657, 163), (658, 163), (659, 163),
(659, 162), (660, 162), (660, 161), (661, 161), (662, 161), (663, 161), (663, 162), (664, 162), (664,
163), (665, 163), (666, 163), (667, 163), (668, 163), (669, 163), (669, 164), (669, 165), (670, 165),
(671, 165), (672, 165), (672, 164), (672, 163), (673, 163), (674, 163), (674, 164), (675, 164), (675,
165), (676, 165), (676, 166), (677, 166), (678, 166), (678, 167), (678, 168), (678, 169), (678, 170),
(678, 171), (678, 172), (679, 172), (680, 172), (680, 173), (680, 174), (680, 175), (681, 175), (682,
175), (682, 174), (683, 174), (684, 174), (685, 174), (686, 174), (687, 174), (688, 174), (688, 175),
(688, 176), (689, 176), (689, 177), (690, 177), (690, 178), (690, 179), (690, 180), (690, 181), (690,
182), (691, 182), (692, 182), (692, 183), (692, 184), (692, 185), (693, 185), (693, 186), (693, 187),
(694, 187), (694, 188), (695, 188), (696, 188), (696, 189), (696, 190), (697, 190), (698, 190), (699,
190), (700, 190), (701, 190), (701, 189), (702, 189), (703, 189), (703, 190), (703, 191), (704, 191),
(704, 192), (705, 192), (706, 192), (707, 192), (708, 192), (709, 192), (709, 191), (710, 191), (711,
191), (711, 192), (712, 192), (713, 192), (714, 192), (715, 192), (715, 193), (715, 194), (715, 195),
(716, 195), (717, 195), (718, 195), (719, 195), (720, 195), (721, 195), (722, 195), (723, 195), (724, 195), (727, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728, 195), (728
195), (725, 195), (726, 195), (726, 196), (726, 197), (726, 198), (727, 198), (728, 198), (728, 199),
(729, 199), (730, 199), (731, 199), (732, 199), (732, 200), (733, 200), (734, 200), (735, 200), (736,
200), (737, 200), (737, 201), (738, 201), (739, 201), (740, 201), (740, 202), (740, 203), (741, 203),
(742, 203), (743, 203), (744, 203), (745, 203), (745, 204), (746, 204), (746, 205), (747, 205), (748,
205), (749, 205), (750, 205), (751, 205), (752, 205), (752, 204), (753, 204), (754, 204), (755, 204),
(756, 204), (757, 204), (757, 205), (757, 206), (757, 207), (757, 208), (758, 208), (759, 208), (760,
208), (761, 208), (762, 208), (763, 208), (763, 209), (763, 210), (764, 210), (765, 210), (766, 210),
(766, 211), (767, 211), (768, 211), (769, 211), (770, 211), (770, 210), (771, 210), (772, 210), (773,
210), (774, 210), (775, 210), (776, 210), (777, 210), (777, 209), (777, 208), (777, 207), (778, 207),
(778, 206), (779, 206), (780, 206), (780, 205), (780, 204), (781, 204), (782, 204), (783, 204), (783,
205), (784, 205), (785, 205), (786, 205), (786, 206), (787, 206), (788, 206), (789, 206), (790, 206),
(791, 206), (792, 206), (793, 206), (794, 206), (795, 206), (796, 206), (797, 206), (798, 206), (798,
```

```
207), (799, 207), (800, 207), (801, 207), (802, 207), (803, 207), (804, 207), (804, 208), (805, 208),
(806, 208), (806, 207), (807, 207), (808, 207), (809, 207), (810, 207), (810, 208), (811, 208), (812,
208), (812, 209), (813, 209), (814, 209), (815, 209), (815, 210), (815, 211), (815, 212), (816, 212),
(817, 212), (818, 212), (818, 213), (818, 214), (819, 214), (819, 215), (819, 216), (819, 217), (820,
217), (820, 218), (820, 219), (821, 219), (821, 220), (821, 221), (822, 221), (823, 221), (823, 220),
(824, 220), (825, 220), (825, 221), (826, 221), (827, 221), (827, 222), (828, 222), (828, 223), (828,
224), (829, 224), (829, 225), (830, 225), (830, 226), (831, 226), (831, 227), (831, 228), (831, 229),
(832, 229), (832, 230), (833, 230), (834, 230), (835, 230), (835, 231), (836, 231), (837, 231), (838,
231), (839, 231), (840, 231), (841, 231), (842, 231), (843, 231), (844, 231), (844, 232), (845, 232),
(846, 232), (846, 233), (847, 233), (848, 233), (849, 233), (850, 233), (850, 234), (850, 235), (850,
236), (851, 236), (852, 236), (852, 237), (852, 238), (852, 239), (853, 239), (853, 240), (854, 240),
(855, 240), (856, 240), (857, 240), (857, 241), (858, 241), (859, 241), (860, 241), (860, 242), (861,
242), (862, 242), (863, 242), (864, 242), (865, 242), (866, 242), (867, 242), (867, 243), (867, 244),
(867, 245), (867, 246), (868, 246), (869, 246), (869, 247), (869, 248), (870, 248), (871, 248), (871,
249), (871, 250), (872, 250), (872, 251), (872, 252), (873, 252), (874, 252), (875, 252), (876, 252),
(877, 252), (878, 252), (879, 252), (879, 253), (879, 254), (879, 255), (878, 255), (878, 256), (878,
257), (878, 258), (879, 258), (879, 259), (879, 260), (880, 260), (880, 261), (880, 262), (880, 263),
(881, 263), (882, 263), (883, 263), (884, 263), (885, 263), (885, 264), (886, 264), (887, 264), (887,
265), (887, 266), (887, 267), (887, 268), (887, 269), (887, 270), (888, 270), (889, 270), (889, 269),
(890, 269), (891, 269), (891, 270), (892, 270), (892, 271), (892, 272), (892, 273), (893, 273), (894,
273), (895, 273), (895, 274), (895, 275), (895, 276), (895, 277), (894, 277), (894, 278), (894, 279),
(894, 280), (894, 281), (894, 282), (895, 282), (895, 283), (895, 284), (896, 284), (896, 285), (896,
286), (897, 286), (898, 286), (899, 286), (900, 286), (900, 287), (900, 288), (900, 289), (900, 290),
(900, 291), (901, 291), (902, 291), (902, 292), (903, 292), (903, 293), (904, 293), (904, 294), (905,
294), (906, 294), (907, 294), (908, 294), (909, 294), (909, 295), (909, 296), (910, 296), (911, 296),
(912, 296), (913, 296), (913, 297), (913, 298), (914, 298), (915, 298), (915, 299), (916, 299), (917,
299), (918, 299), (919, 299), (920, 299), (921, 299), (922, 299), (923, 299), (924, 299), (925, 299),
(925, 300), (926, 300), (927, 300), (928, 300), (929, 300), (929, 301), (930, 301), (931, 301), (931,
300), (931, 299), (932, 299), (933, 299), (934, 299), (935, 299), (935, 298), (936, 298), (937, 298),
(937, 299), (938, 299), (939, 299), (940, 299), (940, 300), (940, 301), (941, 301), (942, 301), (943,
301), (943, 302), (943, 303), (943, 304), (943, 305), (944, 305), (945, 305), (946, 305), (946, 306),
(947, 306), (948, 306), (948, 307), (949, 307), (950, 307), (951, 307), (952, 307), (953, 307), (954,
307), (955, 307), (955, 308), (955, 309), (955, 310), (955, 311), (955, 312), (955, 313), (956, 313),
(957, 313), (957, 314), (958, 314), (959, 314), (960, 314), (960, 315), (960, 316), (960, 317), (961,
317), (961, 318), (961, 319), (961, 320), (961, 321), (961, 322), (961, 323), (962, 323), (963, 323),
(964, 323), (964, 324), (965, 324), (966, 324), (967, 324), (967, 325), (968, 325), (969, 325), (970,
325), (970, 326), (970, 327), (969, 327), (969, 328), (969, 329), (969, 330), (969, 331), (969, 332),
(969, 333), (968, 333), (967, 333), (967, 334), (967, 335), (967, 336), (967, 337), (967, 338), (968,
338), (968, 339), (968, 340), (967, 340), (966, 340), (966, 341), (966, 342), (965, 342), (964, 342),
(964, 343), (963, 343), (963, 344), (963, 345), (963, 346), (964, 346), (964, 347), (964, 348), (964,
349), (964, 350), (964, 351), (963, 351), (962, 351), (961, 351), (960, 351), (959, 351), (959, 352),
(959, 353), (959, 354), (959, 355), (959, 356), (959, 357), (959, 358), (959, 359), (959, 360), (959,
361), (959, 362), (959, 363), (960, 363), (960, 364), (960, 365), (959, 365), (958, 365), (957, 365),
(956, 365), (955, 365), (954, 365), (954, 366), (954, 367), (953, 367), (952, 367), (952, 368), (952,
369), (951, 369), (950, 369), (949, 369), (949, 370), (949, 371), (950, 371), (950, 372), (950, 373),
(950, 374), (950, 375), (950, 376), (950, 377), (950, 378), (950, 379), (951, 379), (951, 380), (952,
380), (952, 381), (952, 382), (952, 383), (953, 383), (953, 384), (953, 385), (953, 386), (952, 386),
(952, 387), (952, 388), (952, 389), (952, 390), (952, 391), (952, 392), (952, 393), (952, 394), (952,
```

```
395), (951, 395), (951, 396), (951, 397), (951, 398), (951, 399), (950, 399), (950, 400), (949, 400),
(949, 401), (949, 402), (949, 403), (949, 404), (950, 404), (950, 405), (950, 406), (950, 407), (950,
408), (951, 408), (951, 409), (952, 409), (953, 409), (953, 410), (953, 411), (953, 412), (954, 412),
(954, 413), (955, 413), (955, 414), (955, 415), (955, 416), (956, 416), (957, 416), (958, 416), (959,
416), (960, 416), (961, 416), (961, 417), (961, 418), (961, 419), (962, 419), (962, 420), (963, 420),
(963, 421), (964, 421), (964, 422), (964, 423), (964, 424), (964, 425), (964, 426), (964, 427), (963,
427), (963, 428), (963, 429), (963, 430), (963, 431), (962, 431), (962, 432), (962, 433), (962, 434),
(962, 435), (962, 436), (962, 437), (962, 438), (962, 439), (961, 439), (960, 439), (960, 440), (960,
441), (960, 442), (960, 443), (960, 444), (960, 445), (960, 446), (960, 447), (960, 448), (959, 448),
(958, 448), (958, 449), (958, 450), (958, 451), (958, 452), (957, 452), (957, 453), (956, 453), (956,
454), (956, 455), (955, 455), (955, 456), (955, 457), (954, 457), (953, 457), (953, 458), (952, 458),
(952, 459), (951, 459), (950, 459), (950, 460), (950, 461), (950, 462), (950, 463), (950, 464), (950,
465), (950, 466), (949, 466), (949, 467), (948, 467), (948, 468), (947, 468), (947, 469), (947, 470),
(948, 470), (948, 471), (948, 472), (948, 473), (947, 473), (947, 474), (947, 475), (946, 475), (946,
476), (946, 477), (946, 478), (945, 478), (944, 478), (943, 478), (942, 478), (941, 478), (941, 479),
(941, 480), (941, 481), (941, 482), (941, 483), (941, 484), (941, 485), (941, 486), (941, 487), (941,
488), (941, 489), (940, 489), (940, 490), (940, 491), (939, 491), (939, 492), (939, 493), (939, 494),
(939, 495), (939, 496), (939, 497), (939, 498), (939, 499), (939, 500), (939, 501), (939, 502), (938,
502), (938, 503), (938, 504), (939, 504), (939, 505), (939, 506), (938, 506), (938, 507), (938, 508),
(937, 508), (937, 509), (936, 509), (936, 510), (936, 511), (935, 511), (935, 512), (934, 512), (934,
513), (934, 514), (934, 515), (935, 515), (936, 515), (936, 516), (936, 517), (936, 518), (937, 518),
(938, 518), (938, 519), (938, 520), (938, 521), (938, 522), (938, 523), (938, 524), (938, 525), (938,
526), (938, 527), (938, 528), (938, 529), (938, 530), (937, 530), (937, 531), (937, 532), (937, 533),
(936, 533), (935, 533), (934, 533), (933, 533), (933, 534), (932, 534), (931, 534), (931, 535), (930,
535), (930, 536), (930, 537), (930, 538), (929, 538), (928, 538), (928, 539), (928, 540), (927, 540),
(926, 540), (925, 540), (925, 541), (925, 542), (924, 542), (924, 543), (924, 544), (924, 545), (924,
546), (924, 547), (924, 548), (924, 549), (924, 550), (924, 551), (924, 552), (923, 552), (923, 553),
(923, 554), (924, 554), (924, 555), (924, 556), (923, 556), (922, 556), (922, 557), (922, 558), (922,
559), (922, 560), (923, 560), (923, 561), (923, 562), (923, 563), (923, 564), (922, 564), (922, 565),
(922, 566), (922, 567), (921, 567), (920, 567), (920, 568), (920, 569), (920, 570), (920, 571), (920,
572), (920, 573), (920, 574), (920, 575), (919, 575), (918, 575), (918, 576), (918, 577), (918, 578),
(918, 579), (918, 580), (918, 581), (918, 582), (918, 583), (918, 584), (918, 585), (918, 586), (918,
587), (919, 587), (919, 588), (919, 589), (919, 590), (919, 591), (920, 591), (920, 592), (920, 593),
(921, 593), (921, 594), (921, 595), (921, 596), (920, 596), (920, 597), (920, 598), (919, 598), (919,
599), (919, 600), (919, 601), (918, 601), (917, 601), (917, 602), (917, 603), (916, 603), (915, 603),
(915, 604), (915, 605), (915, 606), (914, 606), (914, 607), (914, 608), (914, 609), (914, 610), (913,
610), (912, 610), (912, 611), (912, 612), (911, 612), (910, 612), (909, 612), (909, 613), (909, 614),
(909, 615), (909, 616), (908, 616), (908, 617), (908, 618), (908, 619), (908, 620), (908, 621), (908,
622), (908, 623), (908, 624), (908, 625), (908, 626), (908, 627), (908, 628), (907, 628), (907, 629),
(906, 629), (906, 630), (906, 631), (906, 632), (907, 632), (907, 633), (907, 634), (907, 635), (907,
636), (908, 636), (909, 636), (910, 636), (911, 636), (911, 637), (911, 638), (911, 639), (910, 639),
(910, 640), (910, 641), (910, 642), (909, 642), (909, 643), (909, 644), (909, 645), (908, 645), (907,
645), (906, 645), (906, 646), (905, 646), (904, 646), (904, 647), (904, 648), (904, 649), (904, 650),
(904, 651), (903, 651), (902, 651), (902, 652), (902, 653), (902, 654), (902, 655), (902, 656), (902,
657), (901, 657), (901, 658), (901, 659), (901, 660), (901, 661), (900, 661), (900, 662), (899, 662),
(899, 663), (899, 664), (899, 665), (899, 666), (899, 667), (899, 668), (899, 669), (898, 669), (898,
670), (898, 671), (898, 672), (898, 673), (898, 674), (898, 675), (898, 676), (898, 677), (898, 678),
(898, 679), (898, 680), (898, 681), (898, 682), (899, 682), (900, 682), (901, 682), (901, 683), (901,
```

```
684), (902, 684), (902, 685), (902, 686), (901, 686), (901, 687), (901, 688), (901, 689), (900, 689),
(900, 690), (900, 691), (900, 692), (900, 693), (900, 694), (900, 695), (900, 696), (901, 696), (901,
697), (901, 698), (900, 698), (899, 698), (898, 698), (897, 698), (896, 698), (896, 699), (896, 700),
(896, 701), (895, 701), (895, 702), (895, 703), (895, 704), (895, 705), (895, 706), (895, 707), (895,
708), (895, 709), (895, 710), (896, 710), (897, 710), (898, 710), (899, 710), (899, 711), (900, 711),
(901, 711), (902, 711), (902, 712), (903, 712), (904, 712), (904, 713), (904, 714), (904, 715), (904,
716), (904, 717), (905, 717), (905, 718), (905, 719), (905, 720), (905, 721), (905, 722), (905, 723),
(905, 724), (905, 725), (905, 726), (905, 727), (905, 728), (905, 729), (906, 729), (907, 729), (907,
730), (908, 730), (908, 731), (908, 732), (907, 732), (906, 732), (906, 733), (906, 734), (906, 735),
(906, 736), (906, 737), (906, 738), (906, 739), (906, 740), (906, 741), (906, 742), (906, 743), (906,
744), (906, 745), (906, 746), (905, 746), (905, 747), (905, 748), (905, 749), (905, 750), (905, 751),
(905, 752), (906, 752), (906, 753), (906, 754), (905, 754), (905, 755), (905, 756), (905, 757), (905,
758), (904, 758), (904, 759), (904, 760), (904, 761), (905, 761), (905, 762), (905, 763), (905, 764),
(905, 765), (904, 765), (904, 766), (904, 767), (904, 768), (904, 769), (904, 770), (905, 770), (905,
771), (905, 772), (905, 773), (904, 773), (903, 773), (903, 774), (903, 775), (903, 776), (903, 777),
(903, 778), (903, 779), (902, 779), (902, 780), (902, 781), (902, 782), (903, 782), (903, 783), (903,
784), (902, 784), (902, 785), (901, 785), (900, 785), (900, 786), (900, 787), (900, 788), (900, 789),
(901, 789), (901, 790), (901, 791), (901, 792), (901, 793), (901, 794), (901, 795), (902, 795), (902,
796), (902, 797), (903, 797), (903, 798), (903, 799), (902, 799), (902, 800), (902, 801), (902, 802),
(902, 803), (902, 804), (902, 805), (902, 806), (902, 807), (902, 808), (902, 809), (902, 810), (902,
811), (903, 811), (903, 812), (904, 812), (904, 813), (905, 813), (906, 813), (906, 814), (907, 814),
(908, 814), (909, 814), (909, 815), (910, 815), (911, 815), (912, 815), (912, 816), (913, 816), (914,
816), (915, 816), (915, 817), (915, 818), (915, 819), (916, 819), (916, 820), (916, 821), (917, 821),
(917, 822), (917, 823), (917, 824), (917, 825), (917, 826), (917, 827), (917, 828), (917, 829), (917,
830), (918, 830), (918, 831), (919, 831), (920, 831), (921, 831), (921, 832), (921, 833), (921, 834),
(922, 834), (923, 834), (924, 834), (924, 835), (925, 835), (925, 836), (926, 836), (926, 837), (926,
838), (927, 838), (927, 839), (927, 840), (927, 841), (927, 842), (927, 843), (928, 843), (928, 844),
(928, 845), (929, 845), (929, 846), (929, 847), (929, 848), (929, 849), (930, 849), (931, 849), (931,
850), (931, 851), (931, 852), (932, 852), (932, 853), (932, 854), (932, 855), (933, 855), (933, 856),
(934, 856), (934, 857), (934, 858), (934, 859), (934, 860), (933, 860), (933, 861), (933, 862), (933,
863), (933, 864), (933, 865), (932, 865), (932, 866), (932, 867), (932, 868), (932, 869), (932, 870),
(932, 871), (932, 872), (932, 873), (932, 874), (932, 875), (932, 876), (932, 877), (931, 877), (930,
877), (930, 878), (930, 879), (929, 879), (928, 879), (927, 879), (927, 880), (926, 880), (926, 881),
(925, 881), (924, 881), (923, 881), (923, 882), (922, 882), (922, 883), (921, 883), (920, 883), (919,
883), (919, 882), (918, 882), (917, 882), (917, 883), (917, 884), (917, 885), (916, 885), (915, 885),
(915, 886), (915, 887), (914, 887), (913, 887), (913, 888), (913, 889), (913, 890), (913, 891), (913,
892), (913, 893), (913, 894), (913, 895), (914, 895), (915, 895), (915, 896), (915, 897), (914, 897),
(914, 898), (914, 899), (914, 900), (914, 901), (914, 902), (915, 902), (915, 903), (915, 904), (915,
905), (915, 906), (915, 907), (915, 908), (916, 908), (916, 909), (916, 910), (915, 910), (915, 911),
(915, 912), (915, 913), (915, 914), (914, 914), (914, 915), (914, 916), (914, 917), (914, 918), (914,
919), (914, 920), (913, 920), (913, 921), (913, 922), (913, 923), (913, 924), (913, 925), (914, 925),
(914, 926), (915, 926), (916, 926), (916, 927), (917, 927), (918, 927), (918, 928), (918, 929), (918,
930), (919, 930), (919, 931), (919, 932), (919, 933), (919, 934), (919, 935), (919, 936), (919, 937),
(919, 938), (919, 939), (919, 940), (919, 941), (918, 941), (918, 942), (918, 943), (918, 944), (918,
945), (918, 946), (918, 947), (919, 947), (919, 948), (919, 949), (919, 950), (919, 951), (919, 952),
(918, 952), (918, 953), (918, 954), (918, 955), (918, 956), (918, 957), (918, 958), (918, 959), (918,
960), (917, 960), (917, 961), (917, 962), (917, 963), (917, 964), (917, 965), (917, 966), (917, 967),
(917, 968), (918, 968), (919, 968), (919, 969), (919, 970), (919, 971), (919, 972), (919, 973), (920,
```

```
973), (920, 974), (920, 975), (920, 976), (921, 976), (922, 976), (923, 976), (924, 976), (925, 976),
(926, 976), (927, 976), (927, 977), (927, 978), (928, 978), (928, 979), (928, 980), (928, 981), (928,
982), (928, 983), (928, 984), (928, 985), (928, 986), (929, 986), (929, 987), (930, 987), (930, 988),
(930, 989), (930, 990), (930, 991), (930, 992), (930, 993), (929, 993), (929, 994), (928, 994), (928,
995), (928, 996), (928, 997), (928, 998), (928, 999), (928, 1000), (928, 1001), (929, 1001), (929, 1002),
(930, 1002), (931, 1002), (931, 1003), (931, 1004), (931, 1005), (932, 1005), (933, 1005), (933, 1006),
(934, 1006), (934, 1007), (934, 1008), (935, 1008), (935, 1009), (936, 1009), (937, 1009), (938, 1009),
(938, 1010), (938, 1011), (938, 1012), (938, 1013), (938, 1014), (938, 1015), (938, 1016), (938, 1017),
(938, 1018), (937, 1018), (936, 1018), (935, 1018), (934, 1018), (934, 1019), (934, 1020), (934, 1021),
(935, 1021), (935, 1022), (936, 1022), (936, 1023), (936, 1024), (936, 1025), (936, 1026), (936, 1027),
(936, 1028), (937, 1028), (938, 1028), (938, 1029), (938, 1030), (938, 1031), (938, 1032), (938, 1033),
(938, 1034), (938, 1035), (938, 1036), (938, 1037), (938, 1038), (938, 1039), (938, 1040), (939, 1040),
(939, 1041), (940, 1041), (940, 1042), (941, 1042), (941, 1043), (941, 1044), (941, 1045), (940, 1045),
(940, 1046), (940, 1047), (940, 1048), (940, 1049), (939, 1049), (939, 1050), (938, 1050), (938, 1051),
(938, 1052), (938, 1053), (938, 1054), (938, 1055), (939, 1055), (939, 1056), (939, 1057), (939, 1058),
(939, 1059), (940, 1059), (940, 1060), (940, 1061), (940, 1062), (940, 1063), (941, 1063), (942, 1063),
(943, 1063), (943, 1064), (944, 1064), (944, 1065), (944, 1066), (943, 1066), (942, 1066), (942, 1067),
(942, 1068), (942, 1069), (942, 1070), (943, 1070), (944, 1070), (944, 1071), (944, 1072), (944, 1073),
(943, 1073), (943, 1074), (943, 1075), (943, 1076), (943, 1077), (943, 1078), (943, 1079), (943, 1080),
(943, 1081), (943, 1082), (943, 1083), (943, 1084), (944, 1084), (945, 1084), (945, 1085), (945, 1086),
(945, 1087), (945, 1088), (944, 1088), (944, 1089), (944, 1090), (943, 1090), (942, 1090), (942, 1091),
(942, 1092), (942, 1093), (941, 1093), (941, 1094), (941, 1095), (941, 1096), (941, 1097), (941, 1098),
(940, 1098), (940, 1099), (940, 1100), (940, 1101), (940, 1102), (940, 1103), (940, 1104), (940, 1105),
(940, 1106), (940, 1107), (941, 1107), (941, 1108), (941, 1109), (941, 1110), (941, 1111), (940, 1111),
(940, 1112), (939, 1112), (938, 1112), (938, 1113), (938, 1114), (938, 1115), (938, 1116), (938, 1117),
(937, 1117), (936, 1117), (935, 1117), (935, 1118), (934, 1118), (933, 1118), (932, 1118), (932, 1119),
(932, 1120), (932, 1121), (932, 1122), (931, 1122), (931, 1123), (930, 1123), (929, 1123), (928, 1123),
(928, 1124), (928, 1125), (928, 1126), (928, 1127), (928, 1128), (928, 1129), (928, 1130), (927, 1130),
(927, 1131), (927, 1132), (928, 1132), (928, 1133), (928, 1134), (928, 1135), (928, 1136), (929, 1136),
(929, 1137), (930, 1137), (930, 1138), (930, 1139), (930, 1140), (930, 1141), (930, 1142), (930, 1143),
(930, 1144), (929, 1144), (929, 1145), (929, 1146), (930, 1146), (930, 1147), (930, 1148), (931, 1148),
(931, 1149), (931, 1150), (930, 1150), (930, 1151), (930, 1152), (929, 1152), (929, 1153), (928, 1153),
(928, 1154), (928, 1155), (927, 1155), (926, 1155), (926, 1156), (926, 1157), (926, 1158), (927, 1158),
(928, 1158), (928, 1159), (928, 1160), (928, 1161), (929, 1161), (930, 1161), (930, 1162), (930, 1163),
(931, 1163), (931, 1164), (931, 1165), (931, 1166), (931, 1167), (931, 1168), (931, 1169), (932, 1169),
(933, 1169), (933, 1170), (933, 1171), (933, 1172), (933, 1173), (934, 1173), (935, 1173), (936, 1173),
(936, 1174), (936, 1175), (937, 1175), (937, 1176), (938, 1176), (938, 1177), (938, 1178), (938, 1179),
(938, 1180), (938, 1181), (938, 1182), (938, 1183), (937, 1183), (936, 1183), (935, 1183), (935, 1184),
(935, 1185), (935, 1186), (935, 1187), (935, 1188), (935, 1189), (935, 1190), (934, 1190), (934, 1191),
(933, 1191), (933, 1192), (933, 1193), (933, 1194), (934, 1194), (935, 1194), (935, 1195), (935, 1196),
(935, 1197), (935, 1198), (936, 1198), (936, 1199), (936, 1200), (936, 1201), (936, 1202), (937, 1202),
(937, 1203), (937, 1204), (937, 1205), (937, 1206), (938, 1206), (938, 1207), (938, 1208), (938, 1209),
(939, 1209), (939, 1210), (940, 1210), (940, 1211), (940, 1212), (941, 1212), (942, 1212), (942, 1213),
(942, 1214), (942, 1215), (942, 1216), (942, 1217), (942, 1218), (942, 1219), (942, 1220), (943, 1220),
(943, 1221), (944, 1221), (944, 1222), (944, 1223), (944, 1224), (944, 1225), (944, 1226), (944, 1227),
(944, 1228), (944, 1229), (944, 1230), (944, 1231), (944, 1232), (944, 1233), (943, 1233), (943, 1234),
(943, 1235), (943, 1236), (943, 1237), (944, 1237), (944, 1238), (944, 1239), (944, 1240), (944, 1241),
(944, 1242), (944, 1243), (944, 1244), (943, 1244), (942, 1244), (942, 1245), (942, 1246), (942, 1247),
```

```
(942, 1248), (942, 1249), (942, 1250), (943, 1250), (943, 1251), (944, 1251), (944, 1252), (944, 1253),
(943, 1253), (943, 1254), (942, 1254), (942, 1255), (942, 1256), (943, 1256), (944, 1256), (944, 1257),
(944, 1258), (944, 1259), (944, 1260), (944, 1261), (944, 1262), (944, 1263), (944, 1264), (944, 1265),
(944, 1266), (944, 1267), (945, 1267), (945, 1268), (945, 1269), (945, 1270), (945, 1271), (945, 1272),
(945, 1273), (945, 1274), (945, 1275), (945, 1276), (945, 1277), (945, 1278), (945, 1279), (946, 1279),
(946, 1280), (946, 1281), (947, 1281), (948, 1281), (949, 1281), (950, 1281), (951, 1281), (951, 1282),
(951, 1283), (951, 1284), (951, 1285), (952, 1285), (952, 1286), (952, 1287), (952, 1288), (952, 1289),
(952, 1290), (952, 1291), (951, 1291), (951, 1292), (951, 1293), (951, 1294), (951, 1295), (951, 1296),
(951, 1297), (951, 1298), (951, 1299), (951, 1300), (951, 1301), (951, 1302), (951, 1303), (950, 1303),
(949, 1303), (949, 1304), (949, 1305), (949, 1306), (949, 1307), (949, 1308), (949, 1309), (949, 1310),
(949, 1311), (949, 1312), (949, 1313), (949, 1314), (949, 1315), (949, 1316), (949, 1317), (950, 1317),
(950, 1318), (950, 1319), (950, 1320), (950, 1321), (950, 1322), (950, 1323), (950, 1324), (951, 1324),
(951, 1325), (951, 1326), (951, 1327), (951, 1328), (952, 1328), (953, 1328), (953, 1329), (954, 1329),
(955, 1329), (955, 1330), (955, 1331), (955, 1332), (955, 1333), (956, 1333), (956, 1334), (956, 1335),
(956, 1336), (956, 1337), (956, 1338), (956, 1339), (956, 1340), (956, 1341), (956, 1342), (957, 1342),
(957, 1343), (957, 1344), (958, 1344), (959, 1344), (960, 1344), (961, 1344), (961, 1345), (961, 1346),
(961, 1347), (961, 1348), (961, 1349), (961, 1350), (961, 1351), (961, 1352), (961, 1353), (961, 1354),
(961, 1355), (961, 1356), (961, 1357), (961, 1358), (960, 1358), (960, 1359), (960, 1360), (960, 1361),
(960, 1362), (960, 1363), (959, 1363), (958, 1363), (957, 1363), (957, 1364), (957, 1365), (957, 1366),
(957, 1367), (957, 1368), (957, 1369), (956, 1369), (955, 1369), (955, 1370), (955, 1371), (954, 1371),
(953, 1371), (953, 1372), (953, 1373), (953, 1374), (952, 1374), (952, 1375), (952, 1376), (952, 1377),
(951, 1377), (951, 1378), (951, 1379), (951, 1380), (951, 1381), (951, 1382), (951, 1383), (950, 1383),
(949, 1383), (948, 1383), (947, 1383), (947, 1384), (947, 1385), (947, 1386), (947, 1387), (947, 1388),
(947, 1389), (947, 1390), (947, 1391), (947, 1392), (947, 1393), (948, 1393), (949, 1393), (950, 1393),
(950, 1394), (951, 1394), (951, 1395), (951, 1396), (951, 1397), (951, 1398), (951, 1399), (951, 1400),
(951, 1401), (952, 1401), (952, 1402), (952, 1403), (952, 1404), (952, 1405), (952, 1406), (952, 1407),
(952, 1408), (952, 1409), (952, 1410), (953, 1410), (953, 1411), (953, 1412), (953, 1413), (953, 1414),
(953, 1415), (953, 1416), (953, 1417), (953, 1418), (952, 1418), (952, 1419), (952, 1420), (953, 1420),
(954, 1420), (955, 1420), (955, 1421), (955, 1422), (955, 1423), (955, 1424), (955, 1425), (956, 1425),
(956, 1426), (956, 1427), (956, 1428), (956, 1429), (956, 1430), (956, 1431), (956, 1432), (956, 1433),
(956, 1434), (956, 1435), (957, 1435), (957, 1436), (957, 1437), (958, 1437), (958, 1438), (958, 1439),
(958, 1440), (957, 1440), (956, 1440), (956, 1441), (956, 1442), (956, 1443), (956, 1444), (956, 1445),
(956, 1446), (956, 1447), (955, 1447), (954, 1447), (954, 1448), (954, 1449), (953, 1449), (953, 1450),
(953, 1451), (953, 1452), (953, 1453), (954, 1453), (954, 1454), (955, 1454), (956, 1454), (956, 1455),
(957, 1455), (958, 1455), (958, 1456), (958, 1457), (958, 1458), (958, 1459), (958, 1460), (958, 1461),
(958, 1462), (958, 1463), (958, 1464), (958, 1465), (958, 1466), (957, 1466), (957, 1467), (956, 1467),
(955, 1467), (954, 1467), (953, 1467), (953, 1468), (953, 1469), (952, 1469), (952, 1470), (952, 1471),
(951, 1471), (951, 1472), (951, 1473), (951, 1474), (951, 1475), (951, 1476), (951, 1477), (951, 1478),
(950, 1478), (949, 1478), (949, 1479), (949, 1480), (949, 1481), (949, 1482), (949, 1483), (948, 1483),
(948, 1484), (948, 1485), (948, 1486), (948, 1487), (948, 1488), (949, 1488), (949, 1489), (949, 1490),
(948, 1490), (947, 1490), (946, 1490), (946, 1491), (946, 1492), (945, 1492), (944, 1492), (944, 1493),
(944, 1494), (944, 1495), (945, 1495), (945, 1496), (946, 1496), (946, 1497), (946, 1498), (946, 1499),
(946, 1500), (946, 1501), (946, 1502), (945, 1502), (945, 1503), (945, 1504), (946, 1504), (946, 1505),
(946, 1506), (946, 1507), (946, 1508), (946, 1509), (947, 1509), (948, 1509), (948, 1510), (948, 1511),
(948, 1512), (949, 1512), (949, 1513), (949, 1514), (949, 1515), (948, 1515), (948, 1516), (948, 1517),
(948, 1518), (948, 1519), (948, 1520), (947, 1520), (946, 1520), (945, 1520), (945, 1521), (945, 1522),
(945, 1523), (946, 1523), (946, 1524), (947, 1524), (948, 1524), (948, 1525), (948, 1526), (948, 1527),
(948, 1528), (948, 1529), (948, 1530), (949, 1530), (949, 1531), (950, 1531), (950, 1532), (950, 1533),
```

```
(950, 1534), (950, 1535), (950, 1536), (950, 1537), (950, 1538), (950, 1539), (950, 1540), (950, 1541),
(949, 1541), (949, 1542), (949, 1543), (948, 1543), (947, 1543), (947, 1544), (947, 1545), (947, 1546),
(947, 1547), (946, 1547), (946, 1548), (946, 1549), (945, 1549), (945, 1550), (944, 1550), (944, 1551),
(943, 1551), (943, 1552), (943, 1553), (943, 1554), (943, 1555), (943, 1556), (943, 1557), (943, 1558),
(943, 1559), (943, 1560), (944, 1560), (944, 1561), (944, 1562), (943, 1562), (942, 1562), (942, 1563),
(942, 1564), (942, 1565), (942, 1566), (941, 1566), (941, 1567), (941, 1568), (941, 1569), (941, 1570),
(941, 1571), (941, 1572), (941, 1573), (941, 1574), (941, 1575), (941, 1576), (941, 1577), (941, 1578),
(941, 1579), (941, 1580), (940, 1580), (940, 1581), (940, 1582), (940, 1583), (939, 1583), (939, 1584),
(939, 1585), (939, 1586), (939, 1587), (939, 1588), (939, 1589), (939, 1590), (940, 1590), (941, 1590),
(941, 1591), (941, 1592), (941, 1593), (942, 1593), (942, 1594), (943, 1594), (943, 1595), (943, 1596),
(943, 1597), (943, 1598), (944, 1598), (944, 1599), (944, 1600), (945, 1600), (945, 1601), (945, 1602),
(946, 1602), (946, 1603), (946, 1604), (946, 1605), (945, 1605), (945, 1606), (945, 1607), (945, 1608),
(945, 1609), (945, 1610), (945, 1611), (945, 1612), (945, 1613), (945, 1614), (944, 1614), (944, 1615),
(944, 1616), (944, 1617), (944, 1618), (944, 1619), (945, 1619), (945, 1620), (945, 1621), (945, 1622),
(945, 1623), (945, 1624), (944, 1624), (943, 1624), (943, 1625), (943, 1626), (944, 1626), (945, 1626),
(946, 1626), (947, 1626), (947, 1627), (947, 1628), (948, 1628), (949, 1628), (950, 1628), (950, 1629),
(950, 1630), (950, 1631), (950, 1632), (950, 1633), (950, 1634), (950, 1635), (950, 1636), (951, 1636),
(952, 1636), (952, 1637), (953, 1637), (953, 1638), (953, 1639), (952, 1639), (951, 1639), (951, 1640),
(951, 1641), (950, 1641), (949, 1641), (949, 1642), (948, 1642), (948, 1643), (948, 1644), (948, 1645),
(948, 1646), (948, 1647), (948, 1648), (949, 1648), (949, 1649), (949, 1650), (949, 1651), (950, 1651),
(950, 1652), (951, 1652), (952, 1652), (952, 1653), (952, 1654), (952, 1655), (951, 1655), (950, 1655),
(950, 1656), (950, 1657), (950, 1658), (950, 1659), (950, 1660), (950, 1661), (951, 1661), (951, 1662),
(951, 1663), (951, 1664), (950, 1664), (950, 1665), (950, 1666), (950, 1667), (950, 1668), (950, 1669),
(949, 1669), (949, 1670), (948, 1670), (948, 1671), (948, 1672), (949, 1672), (950, 1672), (951, 1672),
(951, 1673), (951, 1674), (952, 1674), (953, 1674), (954, 1674), (955, 1674), (956, 1674), (956, 1675),
(957, 1675), (957, 1676), (957, 1677), (957, 1678), (957, 1679), (957, 1680), (957, 1681), (956, 1681),
(956, 1682), (956, 1683), (956, 1684), (956, 1685), (956, 1686), (956, 1687), (956, 1688), (956, 1689),
(956, 1690), (955, 1690), (955, 1691), (954, 1691), (954, 1692), (954, 1693), (954, 1694), (955, 1694),
(956, 1694), (956, 1695), (956, 1696), (957, 1696), (958, 1696), (958, 1697), (958, 1698), (958, 1699),
(958, 1700), (958, 1701), (958, 1702), (958, 1703), (958, 1704), (958, 1705), (958, 1706), (959, 1706),
(959, 1707), (959, 1708), (959, 1709), (959, 1710), (959, 1711), (958, 1711), (958, 1712), (958, 1713),
(959, 1713), (959, 1714), (960, 1714), (960, 1715), (960, 1716), (960, 1717), (960, 1718), (959, 1718),
(959, 1719), (959, 1720), (959, 1721), (960, 1721), (960, 1722), (961, 1722), (962, 1722), (962, 1723),
(963, 1723), (963, 1724), (964, 1724), (964, 1725), (965, 1725), (965, 1726), (965, 1727), (965, 1728),
(966, 1728), (967, 1728), (967, 1729), (968, 1729), (968, 1730), (969, 1730), (969, 1731), (969, 1732),
(968, 1732), (968, 1733), (967, 1733), (967, 1734), (967, 1735), (966, 1735), (966, 1736), (966, 1737),
(967, 1737), (968, 1737), (968, 1738), (968, 1739), (968, 1740), (968, 1741), (968, 1742), (968, 1743),
(969, 1743), (969, 1744), (969, 1745), (970, 1745), (970, 1746), (971, 1746), (972, 1746), (972, 1747),
(972, 1748), (972, 1749), (972, 1750), (972, 1751), (972, 1752), (973, 1752), (974, 1752), (974, 1753),
(974, 1754), (974, 1755), (975, 1755), (976, 1755), (976, 1756), (976, 1757), (976, 1758), (977, 1758),
(978, 1758), (979, 1758), (979, 1759), (979, 1760), (980, 1760), (980, 1761), (980, 1762), (980, 1763),
(981, 1763), (982, 1763), (982, 1764), (983, 1764), (984, 1764), (985, 1764), (985, 1765), (985, 1766),
(985, 1767), (985, 1768), (985, 1769), (984, 1769), (984, 1770), (983, 1770), (983, 1771), (983, 1772),
(984, 1772), (984, 1773), (984, 1774), (984, 1775), (984, 1776), (984, 1777), (984, 1778), (983, 1778),
(983, 1779), (983, 1780), (984, 1780), (984, 1781), (984, 1782), (984, 1783), (984, 1784), (984, 1785),
(984, 1786), (984, 1787), (984, 1788), (985, 1788), (986, 1788), (987, 1788), (987, 1789), (987, 1790),
(987, 1791), (987, 1792), (986, 1792), (986, 1793), (986, 1794), (985, 1794), (984, 1794), (983, 1794),
(983, 1795), (983, 1796), (982, 1796), (981, 1796), (981, 1797), (981, 1798), (981, 1799), (980, 1799),
```

```
(980, 1800), (980, 1801), (981, 1801), (981, 1802), (981, 1803), (980, 1803), (980, 1804), (980, 1805),
(979, 1805), (979, 1806), (979, 1807), (979, 1808), (978, 1808), (977, 1808), (976, 1808), (976, 1809),
(976, 1810), (976, 1811), (976, 1812), (976, 1813), (976, 1814), (976, 1815), (976, 1816), (976, 1817),
(976, 1818), (977, 1818), (977, 1819), (977, 1820), (977, 1821), (977, 1822), (977, 1823), (977, 1824),
(978, 1824), (979, 1824), (979, 1825), (979, 1826), (979, 1827), (978, 1827), (978, 1828), (977, 1828),
(976, 1828), (976, 1829), (976, 1830), (976, 1831), (976, 1832), (977, 1832), (977, 1833), (977, 1834),
(977, 1835), (978, 1835), (978, 1836), (978, 1837), (978, 1838), (979, 1838), (980, 1838), (980, 1839),
(980, 1840), (980, 1841), (979, 1841), (979, 1842), (979, 1843), (979, 1844), (979, 1845), (979, 1846),
(979, 1847), (979, 1848), (978, 1848), (978, 1849), (978, 1850), (979, 1850), (979, 1851), (980, 1851),
(980, 1852), (980, 1853), (980, 1854), (980, 1855), (981, 1855), (982, 1855), (982, 1856), (982, 1857),
(982, 1858), (982, 1859), (983, 1859), (984, 1859), (985, 1859), (985, 1860), (985, 1861), (986, 1861),
(987, 1861), (988, 1861), (988, 1862), (989, 1862), (989, 1863), (989, 1864), (989, 1865), (989, 1866),
(989, 1867), (989, 1868), (988, 1868), (987, 1868), (987, 1869), (987, 1870), (986, 1870), (986, 1871),
(986, 1872), (987, 1872), (988, 1872), (988, 1873), (988, 1874), (988, 1875), (989, 1875), (989, 1876),
(989, 1877), (989, 1878), (990, 1878), (990, 1879), (990, 1880), (991, 1880), (992, 1880), (992, 1881),
(993, 1881), (994, 1881), (995, 1881), (996, 1881), (997, 1881), (997, 1880), (998, 1880), (999, 1880)]
```

Solution for maze-Medium.txt (with BFS):

```
[(0, 1), (1, 1), (2, 1), (3, 1), (3, 2), (3, 3), (4, 3), (5, 3), (5, 4), (5, 5), (6, 5), (6, 6), (6, 7), (6, 8), (7, 8), (7, 8), (7, 8), (7, 8), (8, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), (10, 10), 
9), (8, 9), (9, 9), (10, 9), (11, 9), (12, 9), (13, 9), (14, 9), (15, 9), (16, 9), (17, 9), (18, 9), (19, 9), (19, 10),
(19, 11), (19, 12), (20, 12), (21, 12), (21, 13), (21, 14), (22, 14), (23, 14), (24, 14), (25, 14), (25, 15), (26,
15), (27, 15), (28, 15), (29, 15), (29, 16), (29, 17), (29, 18), (29, 19), (29, 20), (29, 21), (30, 21), (31, 21),
(31, 22), (31, 23), (32, 23), (32, 24), (32, 25), (32, 26), (32, 27), (32, 28), (33, 28), (33, 29), (33, 30), (34,
30), (34, 31), (34, 32), (34, 33), (34, 34), (35, 34), (35, 35), (35, 36), (35, 37), (34, 37), (34, 38), (34, 39),
(34, 40), (34, 41), (35, 41), (36, 41), (37, 41), (37, 42), (38, 42), (38, 43), (38, 44), (38, 45), (39, 45), (39,
46), (39, 47), (39, 48), (39, 49), (38, 49), (38, 50), (38, 51), (38, 52), (38, 53), (38, 54), (38, 55), (38, 56),
(38, 57), (39, 57), (39, 58), (40, 58), (41, 58), (42, 58), (42, 59), (42, 60), (43, 60), (43, 61), (44, 61), (45,
61), (46, 61), (47, 61), (47, 62), (48, 62), (49, 62), (49, 63), (49, 64), (49, 65), (50, 65), (51, 65), (51, 66),
(52, 66), (52, 67), (52, 68), (52, 69), (53, 69), (53, 70), (54, 70), (55, 70), (56, 70), (57, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70), (58, 70
71), (58, 72), (58, 73), (58, 74), (58, 75), (58, 76), (58, 77), (59, 77), (60, 77), (61, 77), (61, 78), (61, 79),
(61, 80), (61, 81), (61, 82), (62, 82), (63, 82), (63, 83), (64, 83), (65, 83), (65, 84), (65, 85), (65, 86), (65,
87), (65, 88), (65, 89), (66, 89), (67, 89), (67, 90), (68, 90), (68, 91), (69, 91), (69, 92), (70, 92), (71, 92),
(71, 93), (72, 93), (73, 93), (73, 92), (74, 92), (75, 92), (75, 93), (76, 93), (76, 94), (76, 95), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76, 96), (76,
97), (77, 97), (77, 98), (78, 98), (78, 99), (79, 99), (80, 99), (80, 100), (80, 101), (80, 102), (81, 102),
(81, 103), (81, 104), (81, 105), (81, 106), (81, 107), (82, 107), (82, 108), (82, 109), (82, 110), (83, 110),
(84, 110), (84, 111), (85, 111), (86, 111), (86, 112), (86, 113), (85, 113), (85, 114), (85, 115), (85, 116),
(85, 117), (85, 118), (85, 119), (85, 120), (85, 121), (86, 121), (87, 121), (87, 122), (87, 123), (87, 124),
(88, 124), (89, 124), (90, 124), (90, 125), (91, 125), (91, 126), (91, 127), (91, 128), (91, 129), (91, 130),
(91, 131), (92, 131), (93, 131), (94, 131), (95, 131), (95, 132), (95, 133), (95, 134), (95, 135), (96, 135),
(97, 135), (98, 135), (98, 136), (98, 137), (98, 138), (98, 139), (98, 140), (97, 140), (97, 141), (97, 142),
(97, 143), (97, 144), (97, 145), (97, 146), (97, 147), (97, 148), (96, 148), (95, 148), (95, 149), (95, 150),
(94, 150), (94, 151), (94, 152), (93, 152), (93, 153), (93, 154), (93, 155), (93, 156), (92, 156), (92, 157),
(92, 158), (92, 159), (92, 160), (92, 161), (92, 162), (92, 163), (92, 164), (92, 165), (92, 166), (92, 167),
(92, 168), (92, 169), (92, 170), (92, 171), (92, 172), (92, 173), (92, 174), (92, 175), (92, 176), (92, 177),
(92, 178), (92, 179), (92, 180), (92, 181), (92, 182), (93, 182), (94, 182), (95, 182), (96, 182), (96, 183),
(96, 184), (96, 185), (96, 186), (95, 186), (95, 187), (95, 188), (95, 189), (95, 190), (96, 190), (96, 191),
```

(96, 192), (95, 192), (95, 193), (95, 194), (95, 195), (95, 196), (95, 197), (95, 198), (96, 198), (97, 198), (98, 198), (99, 198)]

Solution for maze-Large.txt (with BFS):

```
[(0, 1), (1, 1), (2, 1), (3, 1), (4, 1), (4, 2), (5, 2), (6, 2), (7, 2), (8, 2), (8, 3), (9, 3), (10, 3), (10, 4), (10, 5),
(10, 6), (11, 6), (11, 7), (12, 7), (13, 7), (14, 7), (15, 7), (16, 7), (16, 8), (16, 9), (16, 10), (16, 11), (17,
11), (18, 11), (18, 12), (19, 12), (20, 12), (20, 13), (20, 14), (20, 15), (20, 16), (20, 17), (21, 17), (22, 17),
(22, 18), (22, 19), (23, 19), (24, 19), (25, 19), (25, 20), (25, 21), (26, 21), (27, 21), (28, 21), (29, 21), (29,
22), (30, 22), (31, 22), (32, 22), (33, 22), (34, 22), (34, 23), (35, 23), (36, 23), (37, 23), (37, 24), (37, 25),
(37, 26), (37, 27), (37, 28), (37, 29), (37, 30), (37, 31), (37, 32), (37, 33), (37, 34), (37, 35), (37, 36), (37, 37)
37), (37, 38), (37, 39), (36, 39), (35, 39), (35, 40), (35, 41), (35, 42), (36, 42), (37, 42), (37, 43), (37, 44),
(37, 45), (36, 45), (36, 46), (36, 47), (37, 47), (37, 48), (37, 49), (37, 50), (38, 50), (39, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40, 50), (40,
51), (40, 52), (41, 52), (42, 52), (43, 52), (43, 53), (43, 54), (43, 55), (43, 56), (44, 56), (45, 56), (45, 57),
(45, 58), (45, 59), (46, 59), (47, 59), (48, 59), (49, 59), (50, 59), (51, 59), (51, 60), (51, 61), (51, 62), (52,
62), (52, 63), (52, 64), (52, 65), (52, 66), (52, 67), (52, 68), (52, 69), (52, 70), (51, 70), (50, 70), (50, 71),
(50, 72), (51, 72), (51, 73), (52, 73), (52, 74), (52, 75), (52, 76), (53, 76), (53, 77), (53, 78), (53, 79), (53,
80), (53, 81), (54, 81), (54, 82), (54, 83), (54, 84), (54, 85), (55, 85), (55, 86), (56, 86), (57, 86), (58, 86),
(58, 87), (58, 88), (58, 89), (58, 90), (58, 91), (58, 92), (58, 93), (58, 94), (58, 95), (58, 96), (59, 96), (60,
96), (61, 96), (61, 97), (62, 97), (63, 97), (64, 97), (65, 97), (65, 98), (65, 99), (65, 100), (65, 101), (66,
101), (66, 102), (66, 103), (66, 104), (66, 105), (66, 106), (67, 106), (67, 107), (68, 107), (69, 107), (70,
107), (70, 108), (70, 109), (70, 110), (70, 111), (70, 112), (70, 113), (71, 113), (72, 113), (73, 113), (73,
114), (73, 115), (73, 116), (73, 117), (73, 118), (74, 118), (74, 119), (74, 120), (74, 121), (75, 121), (76,
121), (77, 121), (77, 122), (77, 123), (76, 123), (76, 124), (76, 125), (76, 126), (77, 126), (78, 126), (78,
127), (79, 127), (80, 127), (80, 126), (80, 125), (80, 124), (80, 123), (80, 122), (81, 122), (82, 122), (83,
122), (83, 123), (84, 123), (85, 123), (86, 123), (86, 122), (86, 121), (87, 121), (88, 121), (89, 121), (90,
121), (91, 121), (92, 121), (93, 121), (94, 121), (94, 120), (94, 119), (94, 118), (95, 118), (96, 118), (97,
118), (98, 118), (99, 118), (100, 118), (100, 117), (101, 117), (102, 117), (102, 116), (102, 115), (102,
114), (103, 114), (104, 114), (104, 113), (105, 113), (106, 113), (106, 114), (107, 114), (108, 114),
(109, 114), (109, 113), (110, 113), (111, 113), (112, 113), (113, 113), (114, 113), (115, 113), (116,
113), (116, 112), (116, 111), (116, 110), (116, 109), (117, 109), (118, 109), (118, 108), (118, 107),
(118, 106), (118, 105), (118, 104), (119, 104), (120, 104), (120, 103), (120, 102), (121, 102), (122,
102), (122, 101), (123, 101), (124, 101), (125, 101), (126, 101), (126, 100), (127, 100), (128, 100),
(128, 99), (129, 99), (129, 98), (129, 97), (129, 96), (130, 96), (130, 95), (131, 95), (132, 95), (133, 95),
(134, 95), (135, 95), (135, 96), (136, 96), (137, 96), (138, 96), (139, 96), (139, 95), (140, 95), (141, 95),
(142, 95), (143, 95), (143, 94), (143, 93), (143, 92), (144, 92), (145, 92), (146, 92), (147, 92), (148, 92),
(149, 92), (150, 92), (151, 92), (152, 92), (152, 91), (152, 90), (152, 89), (152, 88), (153, 88), (153, 87),
(153, 86), (153, 85), (153, 84), (154, 84), (155, 84), (156, 84), (157, 84), (157, 83), (157, 82), (158, 82),
(159, 82), (160, 82), (161, 82), (162, 82), (163, 82), (164, 82), (165, 82), (165, 81), (166, 81), (166, 80),
(167, 80), (167, 79), (168, 79), (169, 79), (169, 78), (169, 77), (170, 77), (171, 77), (172, 77), (173, 77),
(174, 77), (174, 76), (175, 76), (176, 76), (176, 75), (177, 75), (178, 75), (179, 75), (179, 76), (180, 76),
(181, 76), (182, 76), (183, 76), (184, 76), (185, 76), (186, 76), (186, 75), (187, 75), (188, 75), (189, 75),
(190, 75), (191, 75), (192, 75), (193, 75), (194, 75), (195, 75), (196, 75), (197, 75), (198, 75), (199, 75),
(200, 75), (200, 76), (201, 76), (201, 77), (201, 78), (202, 78), (203, 78), (204, 78), (205, 78), (206, 78),
(207, 78), (208, 78), (209, 78), (209, 79), (210, 79), (211, 79), (212, 79), (213, 79), (213, 80), (213, 81),
(214, 81), (215, 81), (216, 81), (217, 81), (217, 82), (217, 83), (218, 83), (219, 83), (220, 83), (221, 83),
(221, 84), (222, 84), (223, 84), (224, 84), (225, 84), (226, 84), (227, 84), (228, 84), (229, 84), (229, 83),
```

```
(230, 83), (231, 83), (232, 83), (233, 83), (234, 83), (234, 84), (234, 85), (235, 85), (236, 85), (237, 85),
(238, 85), (239, 85), (239, 86), (240, 86), (240, 87), (240, 88), (240, 89), (240, 90), (241, 90), (242, 90),
(243, 90), (244, 90), (245, 90), (245, 91), (246, 91), (246, 92), (247, 92), (248, 92), (249, 92), (250, 92),
(250, 91), (251, 91), (252, 91), (253, 91), (254, 91), (255, 91), (256, 91), (256, 90), (256, 89), (257, 89),
(258, 89), (259, 89), (259, 88), (260, 88), (261, 88), (261, 89), (262, 89), (263, 89), (263, 88), (263, 87),
(264, 87), (265, 87), (266, 87), (267, 87), (268, 87), (269, 87), (270, 87), (271, 87), (272, 87), (273, 87),
(274, 87), (275, 87), (276, 87), (277, 87), (277, 86), (277, 85), (278, 85), (279, 85), (280, 85), (281, 85),
(282, 85), (283, 85), (284, 85), (284, 86), (284, 87), (284, 88), (284, 89), (284, 90), (285, 90), (286, 90),
(287, 90), (288, 90), (288, 89), (289, 89), (289, 88), (289, 87), (290, 87), (291, 87), (292, 87), (293, 87),
(294, 87), (294, 86), (295, 86), (296, 86), (297, 86), (298, 86), (299, 86), (299, 85), (299, 84), (300, 84),
(301, 84), (302, 84), (303, 84), (303, 85), (304, 85), (305, 85), (305, 84), (306, 84), (307, 84), (307, 85),
(307, 86), (308, 86), (309, 86), (309, 87), (310, 87), (311, 87), (312, 87), (313, 87), (313, 88), (313, 89),
(313, 90), (314, 90), (315, 90), (315, 91), (315, 92), (316, 92), (317, 92), (318, 92), (319, 92), (319, 91),
(319, 90), (319, 89), (320, 89), (321, 89), (322, 89), (323, 89), (324, 89), (325, 89), (326, 89), (327, 89),
(328, 89), (328, 88), (329, 88), (329, 87), (329, 86), (329, 85), (330, 85), (331, 85), (332, 85), (332, 84),
(333, 84), (334, 84), (334, 85), (335, 85), (336, 85), (336, 84), (336, 83), (337, 83), (338, 83), (339, 83),
(339, 82), (339, 81), (340, 81), (340, 80), (340, 79), (340, 78), (340, 77), (341, 77), (342, 77), (343, 77),
(343, 76), (343, 75), (344, 75), (345, 75), (346, 75), (346, 74), (347, 74), (348, 74), (349, 74), (349, 73),
(350, 73), (351, 73), (352, 73), (352, 72), (352, 71), (353, 71), (354, 71), (355, 71), (356, 71), (357, 71),
(358, 71), (358, 70), (359, 70), (360, 70), (360, 69), (360, 68), (361, 68), (361, 67), (362, 67), (362, 66),
(362, 65), (362, 64), (362, 63), (363, 63), (364, 63), (365, 63), (365, 62), (365, 61), (366, 61), (367, 61),
(368, 61), (369, 61), (370, 61), (370, 60), (370, 59), (371, 59), (372, 59), (373, 59), (374, 59), (375, 59),
(376, 59), (376, 58), (376, 57), (377, 57), (378, 57), (378, 56), (378, 55), (378, 54), (378, 53), (378, 52),
(379, 52), (380, 52), (381, 52), (382, 52), (383, 52), (384, 52), (385, 52), (385, 51), (385, 50), (386, 50),
(387, 50), (388, 50), (389, 50), (390, 50), (391, 50), (392, 50), (393, 50), (394, 50), (395, 50), (396, 50),
(397, 50), (398, 50), (398, 49), (399, 49), (400, 49), (401, 49), (402, 49), (403, 49), (404, 49), (404, 48),
(405, 48), (406, 48), (407, 48), (408, 48), (409, 48), (409, 49), (409, 50), (409, 51), (410, 51), (411, 51),
(411, 52), (411, 53), (412, 53), (412, 54), (413, 54), (414, 54), (414, 55), (415, 55), (416, 55), (416, 56),
(417, 56), (418, 56), (419, 56), (420, 56), (421, 56), (421, 55), (421, 54), (421, 53), (422, 53), (423, 53),
(424, 53), (425, 53), (426, 53), (426, 52), (427, 52), (428, 52), (428, 53), (429, 53), (430, 53), (431, 53),
(432, 53), (432, 52), (433, 52), (434, 52), (435, 52), (435, 53), (436, 53), (437, 53), (437, 52), (437, 51),
(438, 51), (438, 50), (439, 50), (439, 49), (440, 49), (441, 49), (442, 49), (443, 49), (444, 49), (444, 48),
(445, 48), (446, 48), (447, 48), (448, 48), (449, 48), (450, 48), (450, 47), (451, 47), (452, 47), (452, 46),
(453, 46), (454, 46), (454, 45), (455, 45), (456, 45), (457, 45), (457, 44), (457, 43), (457, 42), (457, 41),
(457, 40), (458, 40), (458, 39), (459, 39), (460, 39), (461, 39), (462, 39), (463, 39), (464, 39), (464, 38),
(465, 38), (466, 38), (467, 38), (468, 38), (469, 38), (469, 39), (470, 39), (471, 39), (471, 40), (471, 41),
(472, 41), (473, 41), (474, 41), (474, 42), (475, 42), (476, 42), (477, 42), (478, 42), (479, 42), (480, 42),
(481, 42), (482, 42), (483, 42), (484, 42), (484, 41), (485, 41), (486, 41), (487, 41), (488, 41), (489, 41),
(490, 41), (491, 41), (492, 41), (493, 41), (494, 41), (495, 41), (496, 41), (497, 41), (498, 41), (499, 41),
(500, 41), (501, 41), (502, 41), (503, 41), (504, 41), (504, 40), (505, 40), (506, 40), (507, 40), (508, 40),
(509, 40), (509, 41), (510, 41), (511, 41), (511, 40), (511, 39), (512, 39), (513, 39), (513, 38), (513, 37),
(514, 37), (515, 37), (516, 37), (517, 37), (517, 36), (518, 36), (519, 36), (520, 36), (520, 37), (520, 38),
(520, 39), (521, 39), (522, 39), (523, 39), (524, 39), (525, 39), (526, 39), (527, 39), (528, 39), (529, 39),
(530, 39), (531, 39), (532, 39), (532, 40), (532, 41), (533, 41), (534, 41), (534, 42), (534, 43), (535, 43),
(535, 44), (536, 44), (537, 44), (538, 44), (539, 44), (539, 45), (539, 46), (540, 46), (541, 46), (542, 46),
(543, 46), (544, 46), (544, 45), (545, 45), (545, 44), (546, 44), (547, 44), (547, 45), (548, 45), (549, 45),
(550, 45), (551, 45), (551, 46), (551, 47), (551, 48), (552, 48), (553, 48), (553, 49), (554, 49), (555, 49),
(556, 49), (556, 50), (557, 50), (557, 51), (558, 51), (558, 52), (559, 52), (560, 52), (561, 52), (562, 52),
```

```
(563, 52), (563, 51), (563, 50), (563, 49), (564, 49), (565, 49), (566, 49), (567, 49), (568, 49), (568, 48), (569, 48), (570, 48), (571, 48), (572, 48), (573, 48), (574, 48), (575, 48), (576, 48), (577, 48), (578, 48), (578, 50), (578, 51), (579, 51), (580, 51), (581, 51), (581, 50), (582, 50), (583, 50), (584, 50), (585, 50), (585, 51), (586, 52), (587, 52), (588, 52), (589, 52), (589, 51), (590, 51), (591, 51), (591, 52), (591, 53), (591, 54), (591, 55), (591, 56), (591, 57), (592, 57), (593, 57), (594, 57), (595, 57), (595, 58), (595, 59), (596, 59), (597, 59), (598, 59), (599, 59)]
```

Solution for maze-VLarge.txt (with BFS):

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

```
(293, 37), (293, 38), (294, 38), (294, 39), (294, 40), (295, 40), (295, 41), (296, 41), (297, 41), (298, 41),
(299, 41), (299, 40), (300, 40), (301, 40), (302, 40), (303, 40), (303, 41), (303, 42), (304, 42), (305, 42),
(306, 42), (307, 42), (307, 43), (307, 44), (308, 44), (309, 44), (310, 44), (310, 45), (310, 46), (311, 46),
(311, 47), (312, 47), (312, 48), (312, 49), (312, 50), (313, 50), (314, 50), (314, 51), (315, 51), (316, 51),
(317, 51), (317, 52), (318, 52), (319, 52), (320, 52), (321, 52), (322, 52), (322, 53), (322, 54), (323, 54),
(323, 55), (324, 55), (325, 55), (326, 55), (327, 55), (328, 55), (329, 55), (330, 55), (331, 55), (332, 55),
(332, 56), (332, 57), (332, 58), (333, 58), (334, 58), (334, 59), (334, 60), (335, 60), (336, 60), (337, 60),
(338, 60), (339, 60), (340, 60), (341, 60), (342, 60), (343, 60), (344, 60), (345, 60), (346, 60), (347, 60),
(348, 60), (349, 60), (350, 60), (351, 60), (352, 60), (352, 61), (353, 61), (354, 61), (354, 62), (354, 63),
(354, 64), (354, 65), (355, 65), (356, 65), (356, 64), (357, 64), (358, 64), (359, 64), (359, 65), (360, 65),
(361, 65), (361, 64), (362, 64), (363, 64), (363, 65), (364, 65), (365, 65), (366, 65), (366, 66), (367, 66),
(368, 66), (369, 66), (370, 66), (371, 66), (372, 66), (373, 66), (374, 66), (374, 67), (375, 67), (376, 67),
(377, 67), (377, 68), (378, 68), (379, 68), (380, 68), (380, 69), (381, 69), (382, 69), (382, 70), (382, 71),
(382, 72), (382, 73), (383, 73), (384, 73), (384, 74), (385, 74), (386, 74), (387, 74), (388, 74), (388, 75),
(389, 75), (390, 75), (391, 75), (392, 75), (393, 75), (393, 76), (393, 77), (394, 77), (395, 77), (395, 78),
(395, 79), (396, 79), (396, 80), (396, 81), (396, 82), (396, 83), (396, 84), (396, 85), (397, 85), (398, 85),
(399, 85), (400, 85), (401, 85), (401, 84), (402, 84), (403, 84), (404, 84), (405, 84), (405, 85), (406, 85),
(407, 85), (408, 85), (409, 85), (409, 86), (410, 86), (410, 87), (411, 87), (412, 87), (412, 86), (413, 86),
(413, 85), (414, 85), (415, 85), (415, 84), (415, 83), (415, 82), (416, 82), (417, 82), (418, 82), (418, 81),
(419, 81), (420, 81), (421, 81), (422, 81), (422, 80), (422, 79), (423, 79), (424, 79), (424, 80), (425, 80),
(426, 80), (427, 80), (428, 80), (429, 80), (430, 80), (431, 80), (431, 79), (432, 79), (433, 79), (433, 80),
(433, 81), (433, 82), (434, 82), (435, 82), (436, 82), (437, 82), (437, 81), (438, 81), (439, 81), (440, 81),
(441, 81), (441, 80), (441, 79), (442, 79), (442, 78), (443, 78), (444, 78), (444, 77), (444, 76), (445, 76),
(446, 76), (447, 76), (448, 76), (449, 76), (449, 77), (449, 78), (449, 79), (449, 80), (449, 81), (450, 81),
(451, 81), (452, 81), (453, 81), (453, 82), (453, 83), (453, 84), (454, 84), (455, 84), (456, 84), (457, 84),
(458, 84), (458, 83), (459, 83), (460, 83), (461, 83), (462, 83), (462, 84), (463, 84), (463, 85), (464, 85),
(464, 86), (464, 87), (464, 88), (464, 89), (465, 89), (466, 89), (467, 89), (467, 90), (467, 91), (467, 92),
(467, 93), (468, 93), (469, 93), (470, 93), (471, 93), (472, 93), (473, 93), (474, 93), (475, 93), (475, 94),
(476, 94), (477, 94), (477, 93), (478, 93), (479, 93), (480, 93), (481, 93), (481, 94), (482, 94), (483, 94),
(484, 94), (484, 95), (485, 95), (485, 96), (486, 96), (486, 97), (486, 98), (486, 99), (487, 99), (488, 99),
(489, 99), (490, 99), (491, 99), (492, 99), (493, 99), (493, 100), (494, 100), (495, 100), (496, 100), (497,
100), (498, 100), (499, 100), (499, 99), (499, 98), (500, 98), (501, 98), (502, 98), (503, 98), (504, 98),
(504, 99), (505, 99), (505, 100), (506, 100), (507, 100), (507, 99), (508, 99), (509, 99), (509, 98), (510,
98), (511, 98), (512, 98), (512, 99), (513, 99), (514, 99), (514, 100), (515, 100), (515, 101), (515, 102),
(516, 102), (517, 102), (517, 103), (517, 104), (518, 104), (519, 104), (520, 104), (521, 104), (522,
104), (523, 104), (524, 104), (524, 105), (524, 106), (525, 106), (525, 107), (526, 107), (527, 107),
(528, 107), (529, 107), (530, 107), (530, 108), (531, 108), (532, 108), (533, 108), (533, 107), (534,
107), (534, 106), (535, 106), (536, 106), (537, 106), (538, 106), (539, 106), (540, 106), (541, 106),
(542, 106), (543, 106), (544, 106), (545, 106), (546, 106), (547, 106), (548, 106), (548, 107), (549,
107), (550, 107), (550, 106), (551, 106), (552, 106), (552, 107), (553, 107), (553, 108), (554, 108),
(555, 108), (556, 108), (557, 108), (558, 108), (559, 108), (560, 108), (561, 108), (562, 108), (563,
108), (564, 108), (564, 109), (564, 110), (565, 110), (566, 110), (567, 110), (567, 111), (567, 112),
(567, 113), (568, 113), (568, 114), (568, 115), (568, 116), (569, 116), (569, 117), (570, 117), (571,
117), (571, 116), (572, 116), (573, 116), (574, 116), (575, 116), (576, 116), (577, 116), (577, 117),
(577, 118), (577, 119), (578, 119), (579, 119), (579, 120), (580, 120), (581, 120), (582, 120), (582,
121), (582, 122), (582, 123), (583, 123), (583, 124), (583, 125), (583, 126), (583, 127), (583, 128),
(582, 128), (582, 129), (582, 130), (583, 130), (584, 130), (584, 131), (584, 132), (584, 133), (585,
133), (585, 134), (586, 134), (586, 135), (586, 136), (586, 137), (586, 138), (586, 139), (587, 139),
```

```
(588, 139), (589, 139), (590, 139), (591, 139), (592, 139), (592, 138), (592, 137), (593, 137), (594,
137), (595, 137), (596, 137), (597, 137), (598, 137), (599, 137), (600, 137), (601, 137), (602, 137),
(602, 138), (603, 138), (604, 138), (605, 138), (606, 138), (607, 138), (608, 138), (608, 139), (608,
140), (609, 140), (610, 140), (611, 140), (611, 141), (611, 142), (612, 142), (613, 142), (614, 142),
(615, 142), (615, 143), (616, 143), (616, 144), (617, 144), (618, 144), (619, 144), (619, 145), (619,
146), (620, 146), (621, 146), (621, 147), (622, 147), (622, 148), (623, 148), (623, 149), (623, 150),
(624, 150), (625, 150), (626, 150), (627, 150), (628, 150), (628, 151), (628, 152), (629, 152), (630,
152), (630, 153), (630, 154), (631, 154), (631, 155), (631, 156), (632, 156), (633, 156), (633, 157),
(634, 157), (635, 157), (635, 158), (636, 158), (637, 158), (638, 158), (639, 158), (639, 159), (640,
159), (640, 160), (641, 160), (642, 160), (643, 160), (644, 160), (645, 160), (646, 160), (647, 160),
(647, 161), (648, 161), (649, 161), (650, 161), (651, 161), (652, 161), (653, 161), (654, 161), (654,
160), (655, 160), (656, 160), (657, 160), (657, 161), (657, 162), (657, 163), (658, 163), (659, 163),
(659, 162), (660, 162), (660, 161), (661, 161), (662, 161), (663, 161), (663, 162), (664, 162), (664,
163), (665, 163), (666, 163), (667, 163), (668, 163), (669, 163), (669, 164), (669, 165), (670, 165),
(671, 165), (672, 165), (672, 164), (672, 163), (673, 163), (674, 163), (674, 164), (675, 164), (675,
165), (676, 165), (676, 166), (677, 166), (678, 166), (678, 167), (678, 168), (678, 169), (678, 170),
(678, 171), (678, 172), (679, 172), (680, 172), (680, 173), (680, 174), (680, 175), (681, 175), (682,
175), (682, 174), (683, 174), (684, 174), (685, 174), (686, 174), (687, 174), (688, 174), (688, 175),
(688, 176), (689, 176), (689, 177), (690, 177), (690, 178), (690, 179), (690, 180), (690, 181), (690,
182), (691, 182), (692, 182), (692, 183), (692, 184), (692, 185), (693, 185), (693, 186), (693, 187),
(694, 187), (694, 188), (695, 188), (696, 188), (696, 189), (696, 190), (697, 190), (698, 190), (699,
190), (700, 190), (701, 190), (701, 189), (702, 189), (703, 189), (703, 190), (703, 191), (704, 191),
(704, 192), (705, 192), (706, 192), (707, 192), (708, 192), (709, 192), (709, 191), (710, 191), (711,
191), (711, 192), (712, 192), (713, 192), (714, 192), (715, 192), (715, 193), (715, 194), (715, 195),
(716, 195), (717, 195), (718, 195), (719, 195), (720, 195), (721, 195), (722, 195), (723, 195), (724,
195), (725, 195), (726, 195), (726, 196), (726, 197), (726, 198), (727, 198), (728, 198), (728, 199),
(729, 199), (730, 199), (731, 199), (732, 199), (732, 200), (733, 200), (734, 200), (735, 200), (736,
200), (737, 200), (737, 201), (738, 201), (739, 201), (740, 201), (740, 202), (740, 203), (741, 203),
(742, 203), (743, 203), (744, 203), (745, 203), (745, 204), (746, 204), (746, 205), (747, 205), (748,
205), (749, 205), (750, 205), (751, 205), (752, 205), (752, 204), (753, 204), (754, 204), (755, 204),
(756, 204), (757, 204), (757, 205), (757, 206), (757, 207), (757, 208), (758, 208), (759, 208), (760,
208), (761, 208), (762, 208), (763, 208), (763, 209), (763, 210), (764, 210), (765, 210), (766, 210),
(766, 211), (767, 211), (768, 211), (769, 211), (770, 211), (770, 210), (771, 210), (772, 210), (773,
210), (774, 210), (775, 210), (776, 210), (777, 210), (777, 209), (777, 208), (777, 207), (778, 207),
(778, 206), (779, 206), (780, 206), (780, 205), (780, 204), (781, 204), (782, 204), (783, 204), (783,
205), (784, 205), (785, 205), (786, 205), (786, 206), (787, 206), (788, 206), (789, 206), (790, 206),
(791, 206), (792, 206), (793, 206), (794, 206), (795, 206), (796, 206), (797, 206), (798, 206), (798,
207), (799, 207), (800, 207), (801, 207), (802, 207), (803, 207), (804, 207), (804, 208), (805, 208),
(806, 208), (806, 207), (807, 207), (808, 207), (809, 207), (810, 207), (810, 208), (811, 208), (812,
208), (812, 209), (813, 209), (814, 209), (815, 209), (815, 210), (815, 211), (815, 212), (816, 212),
(817, 212), (818, 212), (818, 213), (818, 214), (819, 214), (819, 215), (819, 216), (819, 217), (820,
217), (820, 218), (820, 219), (821, 219), (821, 220), (821, 221), (822, 221), (823, 221), (823, 220),
(824, 220), (825, 220), (825, 221), (826, 221), (827, 221), (827, 222), (828, 222), (828, 223), (828,
224), (829, 224), (829, 225), (830, 225), (830, 226), (831, 226), (831, 227), (831, 228), (831, 229),
(832, 229), (832, 230), (833, 230), (834, 230), (835, 230), (835, 231), (836, 231), (837, 231), (838,
231), (839, 231), (840, 231), (841, 231), (842, 231), (843, 231), (844, 231), (844, 232), (845, 232),
(846, 232), (846, 233), (847, 233), (848, 233), (849, 233), (850, 233), (850, 234), (850, 235), (850,
236), (851, 236), (852, 236), (852, 237), (852, 238), (852, 239), (853, 239), (853, 240), (854, 240),
```

```
(855, 240), (856, 240), (857, 240), (857, 241), (858, 241), (859, 241), (860, 241), (860, 242), (861,
242), (862, 242), (863, 242), (864, 242), (865, 242), (866, 242), (867, 242), (867, 243), (867, 244),
(867, 245), (867, 246), (868, 246), (869, 246), (869, 247), (869, 248), (870, 248), (871, 248), (871,
249), (871, 250), (872, 250), (872, 251), (872, 252), (873, 252), (874, 252), (875, 252), (876, 252),
(877, 252), (878, 252), (879, 252), (879, 253), (879, 254), (879, 255), (878, 255), (878, 256), (878,
257), (878, 258), (879, 258), (879, 259), (879, 260), (880, 260), (880, 261), (880, 262), (880, 263),
(881, 263), (882, 263), (883, 263), (884, 263), (885, 263), (885, 264), (886, 264), (887, 264), (887,
265), (887, 266), (887, 267), (887, 268), (887, 269), (887, 270), (888, 270), (889, 270), (889, 269),
(890, 269), (891, 269), (891, 270), (892, 270), (892, 271), (892, 272), (892, 273), (893, 273), (894,
273), (895, 273), (895, 274), (895, 275), (895, 276), (895, 277), (894, 277), (894, 278), (894, 279),
(894, 280), (894, 281), (894, 282), (895, 282), (895, 283), (895, 284), (896, 284), (896, 285), (896,
286), (897, 286), (898, 286), (899, 286), (900, 286), (900, 287), (900, 288), (900, 289), (900, 290),
(900, 291), (901, 291), (902, 291), (902, 292), (903, 292), (903, 293), (904, 293), (904, 294), (905,
294), (906, 294), (907, 294), (908, 294), (909, 294), (909, 295), (909, 296), (910, 296), (911, 296),
(912, 296), (913, 296), (913, 297), (913, 298), (914, 298), (915, 298), (915, 299), (916, 299), (917,
299), (918, 299), (919, 299), (920, 299), (921, 299), (922, 299), (923, 299), (924, 299), (925, 299),
(925, 300), (926, 300), (927, 300), (928, 300), (929, 300), (929, 301), (930, 301), (931, 301), (931,
300), (931, 299), (932, 299), (933, 299), (934, 299), (935, 299), (935, 298), (936, 298), (937, 298),
(937, 299), (938, 299), (939, 299), (940, 299), (940, 300), (940, 301), (941, 301), (942, 301), (943,
301), (943, 302), (943, 303), (943, 304), (943, 305), (944, 305), (945, 305), (946, 305), (946, 306),
(947, 306), (948, 306), (948, 307), (949, 307), (950, 307), (951, 307), (952, 307), (953, 307), (954,
307), (955, 307), (955, 308), (955, 309), (955, 310), (955, 311), (955, 312), (955, 313), (956, 313),
(957, 313), (957, 314), (958, 314), (959, 314), (960, 314), (960, 315), (960, 316), (960, 317), (961,
317), (961, 318), (961, 319), (961, 320), (961, 321), (961, 322), (961, 323), (962, 323), (963, 323),
(964, 323), (964, 324), (965, 324), (966, 324), (967, 324), (967, 325), (968, 325), (969, 325), (970,
325), (970, 326), (970, 327), (969, 327), (969, 328), (969, 329), (969, 330), (969, 331), (969, 332),
(969, 333), (968, 333), (967, 333), (967, 334), (967, 335), (967, 336), (967, 337), (967, 338), (968,
338), (968, 339), (968, 340), (967, 340), (966, 340), (966, 341), (966, 342), (965, 342), (964, 342),
(964, 343), (963, 343), (963, 344), (963, 345), (963, 346), (964, 346), (964, 347), (964, 348), (964,
349), (964, 350), (964, 351), (963, 351), (962, 351), (961, 351), (960, 351), (959, 351), (959, 352),
(959, 353), (959, 354), (959, 355), (959, 356), (959, 357), (959, 358), (959, 359), (959, 360), (959,
361), (959, 362), (959, 363), (960, 363), (960, 364), (960, 365), (959, 365), (958, 365), (957, 365),
(956, 365), (955, 365), (954, 365), (954, 366), (954, 367), (953, 367), (952, 367), (952, 368), (952,
369), (951, 369), (950, 369), (949, 369), (949, 370), (949, 371), (950, 371), (950, 372), (950, 373),
(950, 374), (950, 375), (950, 376), (950, 377), (950, 378), (950, 379), (951, 379), (951, 380), (952,
380), (952, 381), (952, 382), (952, 383), (953, 383), (953, 384), (953, 385), (953, 386), (952, 386),
(952, 387), (952, 388), (952, 389), (952, 390), (952, 391), (952, 392), (952, 393), (952, 394), (952,
395), (951, 395), (951, 396), (951, 397), (951, 398), (951, 399), (950, 399), (950, 400), (949, 400),
(949, 401), (949, 402), (949, 403), (949, 404), (950, 404), (950, 405), (950, 406), (950, 407), (950,
408), (951, 408), (951, 409), (952, 409), (953, 409), (953, 410), (953, 411), (953, 412), (954, 412),
(954, 413), (955, 413), (955, 414), (955, 415), (955, 416), (956, 416), (957, 416), (958, 416), (959,
416), (960, 416), (961, 416), (961, 417), (961, 418), (961, 419), (962, 419), (962, 420), (963, 420),
(963, 421), (964, 421), (964, 422), (964, 423), (964, 424), (964, 425), (964, 426), (964, 427), (963,
427), (963, 428), (963, 429), (963, 430), (963, 431), (962, 431), (962, 432), (962, 433), (962, 434),
(962, 435), (962, 436), (962, 437), (962, 438), (962, 439), (961, 439), (960, 439), (960, 440), (960,
441), (960, 442), (960, 443), (960, 444), (960, 445), (960, 446), (960, 447), (960, 448), (959, 448),
(958, 448), (958, 449), (958, 450), (958, 451), (958, 452), (957, 452), (957, 453), (956, 453), (956,
454), (956, 455), (955, 455), (955, 456), (955, 457), (954, 457), (953, 457), (953, 458), (952, 458),
```

```
(952, 459), (951, 459), (950, 459), (950, 460), (950, 461), (950, 462), (950, 463), (950, 464), (950,
465), (950, 466), (949, 466), (949, 467), (948, 467), (948, 468), (947, 468), (947, 469), (947, 470),
(948, 470), (948, 471), (948, 472), (948, 473), (947, 473), (947, 474), (947, 475), (946, 475), (946,
476), (946, 477), (946, 478), (945, 478), (944, 478), (943, 478), (942, 478), (941, 478), (941, 479),
(941, 480), (941, 481), (941, 482), (941, 483), (941, 484), (941, 485), (941, 486), (941, 487), (941,
488), (941, 489), (940, 489), (940, 490), (940, 491), (939, 491), (939, 492), (939, 493), (939, 494),
(939, 495), (939, 496), (939, 497), (939, 498), (939, 499), (939, 500), (939, 501), (939, 502), (938,
502), (938, 503), (938, 504), (939, 504), (939, 505), (939, 506), (938, 506), (938, 507), (938, 508),
(937, 508), (937, 509), (936, 509), (936, 510), (936, 511), (935, 511), (935, 512), (934, 512), (934,
513), (934, 514), (934, 515), (935, 515), (936, 515), (936, 516), (936, 517), (936, 518), (937, 518),
(938, 518), (938, 519), (938, 520), (938, 521), (938, 522), (938, 523), (938, 524), (938, 525), (938,
526), (938, 527), (938, 528), (938, 529), (938, 530), (937, 530), (937, 531), (937, 532), (937, 533),
(936, 533), (935, 533), (934, 533), (933, 533), (933, 534), (932, 534), (931, 534), (931, 535), (930,
535), (930, 536), (930, 537), (930, 538), (929, 538), (928, 538), (928, 539), (928, 540), (927, 540),
(926, 540), (925, 540), (925, 541), (925, 542), (924, 542), (924, 543), (924, 544), (924, 545), (924,
546), (924, 547), (924, 548), (924, 549), (924, 550), (924, 551), (924, 552), (923, 552), (923, 553),
(923, 554), (924, 554), (924, 555), (924, 556), (923, 556), (922, 556), (922, 557), (922, 558), (922,
559), (922, 560), (923, 560), (923, 561), (923, 562), (923, 563), (923, 564), (922, 564), (922, 565),
(922, 566), (922, 567), (921, 567), (920, 567), (920, 568), (920, 569), (920, 570), (920, 571), (920,
572), (920, 573), (920, 574), (920, 575), (919, 575), (918, 575), (918, 576), (918, 577), (918, 578),
(918, 579), (918, 580), (918, 581), (918, 582), (918, 583), (918, 584), (918, 585), (918, 586), (918,
587), (919, 587), (919, 588), (919, 589), (919, 590), (919, 591), (920, 591), (920, 592), (920, 593),
(921, 593), (921, 594), (921, 595), (921, 596), (920, 596), (920, 597), (920, 598), (919, 598), (919,
599), (919, 600), (919, 601), (918, 601), (917, 601), (917, 602), (917, 603), (916, 603), (915, 603),
(915, 604), (915, 605), (915, 606), (914, 606), (914, 607), (914, 608), (914, 609), (914, 610), (913,
610), (912, 610), (912, 611), (912, 612), (911, 612), (910, 612), (909, 612), (909, 613), (909, 614),
(909, 615), (909, 616), (908, 616), (908, 617), (908, 618), (908, 619), (908, 620), (908, 621), (908,
622), (908, 623), (908, 624), (908, 625), (908, 626), (908, 627), (908, 628), (907, 628), (907, 629),
(906, 629), (906, 630), (906, 631), (906, 632), (907, 632), (907, 633), (907, 634), (907, 635), (907,
636), (908, 636), (909, 636), (910, 636), (911, 636), (911, 637), (911, 638), (911, 639), (910, 639),
(910, 640), (910, 641), (910, 642), (909, 642), (909, 643), (909, 644), (909, 645), (908, 645), (907,
645), (906, 645), (906, 646), (905, 646), (904, 646), (904, 647), (904, 648), (904, 649), (904, 650),
(904, 651), (903, 651), (902, 651), (902, 652), (902, 653), (902, 654), (902, 655), (902, 656), (902,
657), (901, 657), (901, 658), (901, 659), (901, 660), (901, 661), (900, 661), (900, 662), (899, 662),
(899, 663), (899, 664), (899, 665), (899, 666), (899, 667), (899, 668), (899, 669), (898, 669), (898,
670), (898, 671), (898, 672), (898, 673), (898, 674), (898, 675), (898, 676), (898, 677), (898, 678),
(898, 679), (898, 680), (898, 681), (898, 682), (899, 682), (900, 682), (901, 682), (901, 683), (901,
684), (902, 684), (902, 685), (902, 686), (901, 686), (901, 687), (901, 688), (901, 689), (900, 689),
(900, 690), (900, 691), (900, 692), (900, 693), (900, 694), (900, 695), (900, 696), (901, 696), (901,
697), (901, 698), (900, 698), (899, 698), (898, 698), (897, 698), (896, 698), (896, 699), (896, 700),
(896, 701), (895, 701), (895, 702), (895, 703), (895, 704), (895, 705), (895, 706), (895, 707), (895,
708), (895, 709), (895, 710), (896, 710), (897, 710), (898, 710), (899, 710), (899, 711), (900, 711),
(901, 711), (902, 711), (902, 712), (903, 712), (904, 712), (904, 713), (904, 714), (904, 715), (904,
716), (904, 717), (905, 717), (905, 718), (905, 719), (905, 720), (905, 721), (905, 722), (905, 723),
(905, 724), (905, 725), (905, 726), (905, 727), (905, 728), (905, 729), (906, 729), (907, 729), (907,
730), (908, 730), (908, 731), (908, 732), (907, 732), (906, 732), (906, 733), (906, 734), (906, 735),
(906, 736), (906, 737), (906, 738), (906, 739), (906, 740), (906, 741), (906, 742), (906, 743), (906,
744), (906, 745), (906, 746), (905, 746), (905, 747), (905, 748), (905, 749), (905, 750), (905, 751),
```

```
(905, 752), (906, 752), (906, 753), (906, 754), (905, 754), (905, 755), (905, 756), (905, 757), (905,
758), (904, 758), (904, 759), (904, 760), (904, 761), (905, 761), (905, 762), (905, 763), (905, 764),
(905, 765), (904, 765), (904, 766), (904, 767), (904, 768), (904, 769), (904, 770), (905, 770), (905,
771), (905, 772), (905, 773), (904, 773), (903, 773), (903, 774), (903, 775), (903, 776), (903, 777),
(903, 778), (903, 779), (902, 779), (902, 780), (902, 781), (902, 782), (903, 782), (903, 783), (903,
784), (902, 784), (902, 785), (901, 785), (900, 785), (900, 786), (900, 787), (900, 788), (900, 789),
(901, 789), (901, 790), (901, 791), (901, 792), (901, 793), (901, 794), (901, 795), (902, 795), (902,
796), (902, 797), (903, 797), (903, 798), (903, 799), (902, 799), (902, 800), (902, 801), (902, 802),
(902, 803), (902, 804), (902, 805), (902, 806), (902, 807), (902, 808), (902, 809), (902, 810), (902,
811), (903, 811), (903, 812), (904, 812), (904, 813), (905, 813), (906, 813), (906, 814), (907, 814),
(908, 814), (909, 814), (909, 815), (910, 815), (911, 815), (912, 815), (912, 816), (913, 816), (914,
816), (915, 816), (915, 817), (915, 818), (915, 819), (916, 819), (916, 820), (916, 821), (917, 821),
(917, 822), (917, 823), (917, 824), (917, 825), (917, 826), (917, 827), (917, 828), (917, 829), (917,
830), (918, 830), (918, 831), (919, 831), (920, 831), (921, 831), (921, 832), (921, 833), (921, 834),
(922, 834), (923, 834), (924, 834), (924, 835), (925, 835), (925, 836), (926, 836), (926, 837), (926,
838), (927, 838), (927, 839), (927, 840), (927, 841), (927, 842), (927, 843), (928, 843), (928, 844),
(928, 845), (929, 845), (929, 846), (929, 847), (929, 848), (929, 849), (930, 849), (931, 849), (931,
850), (931, 851), (931, 852), (932, 852), (932, 853), (932, 854), (932, 855), (933, 855), (933, 856),
(934, 856), (934, 857), (934, 858), (934, 859), (934, 860), (933, 860), (933, 861), (933, 862), (933,
863), (933, 864), (933, 865), (932, 865), (932, 866), (932, 867), (932, 868), (932, 869), (932, 870),
(932, 871), (932, 872), (932, 873), (932, 874), (932, 875), (932, 876), (932, 877), (931, 877), (930,
877), (930, 878), (930, 879), (929, 879), (928, 879), (927, 879), (927, 880), (926, 880), (926, 881),
(925, 881), (924, 881), (923, 881), (923, 882), (922, 882), (922, 883), (921, 883), (920, 883), (919,
883), (919, 882), (918, 882), (917, 882), (917, 883), (917, 884), (917, 885), (916, 885), (915, 885),
(915, 886), (915, 887), (914, 887), (913, 887), (913, 888), (913, 889), (913, 890), (913, 891), (913,
892), (913, 893), (913, 894), (913, 895), (914, 895), (915, 895), (915, 896), (915, 897), (914, 897),
(914, 898), (914, 899), (914, 900), (914, 901), (914, 902), (915, 902), (915, 903), (915, 904), (915,
905), (915, 906), (915, 907), (915, 908), (916, 908), (916, 909), (916, 910), (915, 910), (915, 911),
(915, 912), (915, 913), (915, 914), (914, 914), (914, 915), (914, 916), (914, 917), (914, 918), (914,
919), (914, 920), (913, 920), (913, 921), (913, 922), (913, 923), (913, 924), (913, 925), (914, 925),
(914, 926), (915, 926), (916, 926), (916, 927), (917, 927), (918, 927), (918, 928), (918, 929), (918,
930), (919, 930), (919, 931), (919, 932), (919, 933), (919, 934), (919, 935), (919, 936), (919, 937),
(919, 938), (919, 939), (919, 940), (919, 941), (918, 941), (918, 942), (918, 943), (918, 944), (918,
945), (918, 946), (918, 947), (919, 947), (919, 948), (919, 949), (919, 950), (919, 951), (919, 952),
(918, 952), (918, 953), (918, 954), (918, 955), (918, 956), (918, 957), (918, 958), (918, 959), (918,
960), (917, 960), (917, 961), (917, 962), (917, 963), (917, 964), (917, 965), (917, 966), (917, 967),
(917, 968), (918, 968), (919, 968), (919, 969), (919, 970), (919, 971), (919, 972), (919, 973), (920,
973), (920, 974), (920, 975), (920, 976), (921, 976), (922, 976), (923, 976), (924, 976), (925, 976),
(926, 976), (927, 976), (927, 977), (927, 978), (928, 978), (928, 979), (928, 980), (928, 981), (928,
982), (928, 983), (928, 984), (928, 985), (928, 986), (929, 986), (929, 987), (930, 987), (930, 988),
(930, 989), (930, 990), (930, 991), (930, 992), (930, 993), (929, 993), (929, 994), (928, 994), (928,
995), (928, 996), (928, 997), (928, 998), (928, 999), (928, 1000), (928, 1001), (929, 1001), (929, 1002),
(930, 1002), (931, 1002), (931, 1003), (931, 1004), (931, 1005), (932, 1005), (933, 1005), (933, 1006),
(934, 1006), (934, 1007), (934, 1008), (935, 1008), (935, 1009), (936, 1009), (937, 1009), (938, 1009),
(938, 1010), (938, 1011), (938, 1012), (938, 1013), (938, 1014), (938, 1015), (938, 1016), (938, 1017),
(938, 1018), (937, 1018), (936, 1018), (935, 1018), (934, 1018), (934, 1019), (934, 1020), (934, 1021),
(935, 1021), (935, 1022), (936, 1022), (936, 1023), (936, 1024), (936, 1025), (936, 1026), (936, 1027),
(936, 1028), (937, 1028), (938, 1028), (938, 1029), (938, 1030), (938, 1031), (938, 1032), (938, 1033),
```

```
(938, 1034), (938, 1035), (938, 1036), (938, 1037), (938, 1038), (938, 1039), (938, 1040), (939, 1040),
(939, 1041), (940, 1041), (940, 1042), (941, 1042), (941, 1043), (941, 1044), (941, 1045), (940, 1045),
(940, 1046), (940, 1047), (940, 1048), (940, 1049), (939, 1049), (939, 1050), (938, 1050), (938, 1051),
(938, 1052), (938, 1053), (938, 1054), (938, 1055), (939, 1055), (939, 1056), (939, 1057), (939, 1058),
(939, 1059), (940, 1059), (940, 1060), (940, 1061), (940, 1062), (940, 1063), (941, 1063), (942, 1063),
(943, 1063), (943, 1064), (944, 1064), (944, 1065), (944, 1066), (943, 1066), (942, 1066), (942, 1067),
(942, 1068), (942, 1069), (942, 1070), (943, 1070), (944, 1070), (944, 1071), (944, 1072), (944, 1073),
(943, 1073), (943, 1074), (943, 1075), (943, 1076), (943, 1077), (943, 1078), (943, 1079), (943, 1080),
(943, 1081), (943, 1082), (943, 1083), (943, 1084), (944, 1084), (945, 1084), (945, 1085), (945, 1086),
(945, 1087), (945, 1088), (944, 1088), (944, 1089), (944, 1090), (943, 1090), (942, 1090), (942, 1091),
(942, 1092), (942, 1093), (941, 1093), (941, 1094), (941, 1095), (941, 1096), (941, 1097), (941, 1098),
(940, 1098), (940, 1099), (940, 1100), (940, 1101), (940, 1102), (940, 1103), (940, 1104), (940, 1105),
(940, 1106), (940, 1107), (941, 1107), (941, 1108), (941, 1109), (941, 1110), (941, 1111), (940, 1111),
(940, 1112), (939, 1112), (938, 1112), (938, 1113), (938, 1114), (938, 1115), (938, 1116), (938, 1117),
(937, 1117), (936, 1117), (935, 1117), (935, 1118), (934, 1118), (933, 1118), (932, 1118), (932, 1119),
(932, 1120), (932, 1121), (932, 1122), (931, 1122), (931, 1123), (930, 1123), (929, 1123), (928, 1123),
(928, 1124), (928, 1125), (928, 1126), (928, 1127), (928, 1128), (928, 1129), (928, 1130), (927, 1130),
(927, 1131), (927, 1132), (928, 1132), (928, 1133), (928, 1134), (928, 1135), (928, 1136), (929, 1136),
(929, 1137), (930, 1137), (930, 1138), (930, 1139), (930, 1140), (930, 1141), (930, 1142), (930, 1143),
(930, 1144), (929, 1144), (929, 1145), (929, 1146), (930, 1146), (930, 1147), (930, 1148), (931, 1148),
(931, 1149), (931, 1150), (930, 1150), (930, 1151), (930, 1152), (929, 1152), (929, 1153), (928, 1153),
(928, 1154), (928, 1155), (927, 1155), (926, 1155), (926, 1156), (926, 1157), (926, 1158), (927, 1158),
(928, 1158), (928, 1159), (928, 1160), (928, 1161), (929, 1161), (930, 1161), (930, 1162), (930, 1163),
(931, 1163), (931, 1164), (931, 1165), (931, 1166), (931, 1167), (931, 1168), (931, 1169), (932, 1169),
(933, 1169), (933, 1170), (933, 1171), (933, 1172), (933, 1173), (934, 1173), (935, 1173), (936, 1173),
(936, 1174), (936, 1175), (937, 1175), (937, 1176), (938, 1176), (938, 1177), (938, 1178), (938, 1179),
(938, 1180), (938, 1181), (938, 1182), (938, 1183), (937, 1183), (936, 1183), (935, 1183), (935, 1184),
(935, 1185), (935, 1186), (935, 1187), (935, 1188), (935, 1189), (935, 1190), (934, 1190), (934, 1191),
(933, 1191), (933, 1192), (933, 1193), (933, 1194), (934, 1194), (935, 1194), (935, 1195), (935, 1196),
(935, 1197), (935, 1198), (936, 1198), (936, 1199), (936, 1200), (936, 1201), (936, 1202), (937, 1202),
(937, 1203), (937, 1204), (937, 1205), (937, 1206), (938, 1206), (938, 1207), (938, 1208), (938, 1209),
(939, 1209), (939, 1210), (940, 1210), (940, 1211), (940, 1212), (941, 1212), (942, 1212), (942, 1213),
(942, 1214), (942, 1215), (942, 1216), (942, 1217), (942, 1218), (942, 1219), (942, 1220), (943, 1220),
(943, 1221), (944, 1221), (944, 1222), (944, 1223), (944, 1224), (944, 1225), (944, 1226), (944, 1227),
(944, 1228), (944, 1229), (944, 1230), (944, 1231), (944, 1232), (944, 1233), (943, 1233), (943, 1234),
(943, 1235), (943, 1236), (943, 1237), (944, 1237), (944, 1238), (944, 1239), (944, 1240), (944, 1241),
(944, 1242), (944, 1243), (944, 1244), (943, 1244), (942, 1244), (942, 1245), (942, 1246), (942, 1247),
(942, 1248), (942, 1249), (942, 1250), (943, 1250), (943, 1251), (944, 1251), (944, 1252), (944, 1253),
(943, 1253), (943, 1254), (942, 1254), (942, 1255), (942, 1256), (943, 1256), (944, 1256), (944, 1257),
(944, 1258), (944, 1259), (944, 1260), (944, 1261), (944, 1262), (944, 1263), (944, 1264), (944, 1265),
(944, 1266), (944, 1267), (945, 1267), (945, 1268), (945, 1269), (945, 1270), (945, 1271), (945, 1272),
(945, 1273), (945, 1274), (945, 1275), (945, 1276), (945, 1277), (945, 1278), (945, 1279), (946, 1279),
(946, 1280), (946, 1281), (947, 1281), (948, 1281), (949, 1281), (950, 1281), (951, 1281), (951, 1282),
(951, 1283), (951, 1284), (951, 1285), (952, 1285), (952, 1286), (952, 1287), (952, 1288), (952, 1289),
(952, 1290), (952, 1291), (951, 1291), (951, 1292), (951, 1293), (951, 1294), (951, 1295), (951, 1296),
(951, 1297), (951, 1298), (951, 1299), (951, 1300), (951, 1301), (951, 1302), (951, 1303), (950, 1303),
(949, 1303), (949, 1304), (949, 1305), (949, 1306), (949, 1307), (949, 1308), (949, 1309), (949, 1310),
(949, 1311), (949, 1312), (949, 1313), (949, 1314), (949, 1315), (949, 1316), (949, 1317), (950, 1317),
```

```
(950, 1318), (950, 1319), (950, 1320), (950, 1321), (950, 1322), (950, 1323), (950, 1324), (951, 1324),
(951, 1325), (951, 1326), (951, 1327), (951, 1328), (952, 1328), (953, 1328), (953, 1329), (954, 1329),
(955, 1329), (955, 1330), (955, 1331), (955, 1332), (955, 1333), (956, 1333), (956, 1334), (956, 1335),
(956, 1336), (956, 1337), (956, 1338), (956, 1339), (956, 1340), (956, 1341), (956, 1342), (957, 1342),
(957, 1343), (957, 1344), (958, 1344), (959, 1344), (960, 1344), (961, 1344), (961, 1345), (961, 1346),
(961, 1347), (961, 1348), (961, 1349), (961, 1350), (961, 1351), (961, 1352), (961, 1353), (961, 1354),
(961, 1355), (961, 1356), (961, 1357), (961, 1358), (960, 1358), (960, 1359), (960, 1360), (960, 1361),
(960, 1362), (960, 1363), (959, 1363), (958, 1363), (957, 1363), (957, 1364), (957, 1365), (957, 1366),
(957, 1367), (957, 1368), (957, 1369), (956, 1369), (955, 1369), (955, 1370), (955, 1371), (954, 1371),
(953, 1371), (953, 1372), (953, 1373), (953, 1374), (952, 1374), (952, 1375), (952, 1376), (952, 1377),
(951, 1377), (951, 1378), (951, 1379), (951, 1380), (951, 1381), (951, 1382), (951, 1383), (950, 1383),
(949, 1383), (948, 1383), (947, 1383), (947, 1384), (947, 1385), (947, 1386), (947, 1387), (947, 1388),
(947, 1389), (947, 1390), (947, 1391), (947, 1392), (947, 1393), (948, 1393), (949, 1393), (950, 1393),
(950, 1394), (951, 1394), (951, 1395), (951, 1396), (951, 1397), (951, 1398), (951, 1399), (951, 1400),
(951, 1401), (952, 1401), (952, 1402), (952, 1403), (952, 1404), (952, 1405), (952, 1406), (952, 1407),
(952, 1408), (952, 1409), (952, 1410), (953, 1410), (953, 1411), (953, 1412), (953, 1413), (953, 1414),
(953, 1415), (953, 1416), (953, 1417), (953, 1418), (952, 1418), (952, 1419), (952, 1420), (953, 1420),
(954, 1420), (955, 1420), (955, 1421), (955, 1422), (955, 1423), (955, 1424), (955, 1425), (956, 1425),
(956, 1426), (956, 1427), (956, 1428), (956, 1429), (956, 1430), (956, 1431), (956, 1432), (956, 1433),
(956, 1434), (956, 1435), (957, 1435), (957, 1436), (957, 1437), (958, 1437), (958, 1438), (958, 1439),
(958, 1440), (957, 1440), (956, 1440), (956, 1441), (956, 1442), (956, 1443), (956, 1444), (956, 1445),
(956, 1446), (956, 1447), (955, 1447), (954, 1447), (954, 1448), (954, 1449), (953, 1449), (953, 1450),
(953, 1451), (953, 1452), (953, 1453), (954, 1453), (954, 1454), (955, 1454), (956, 1454), (956, 1455),
(957, 1455), (958, 1455), (958, 1456), (958, 1457), (958, 1458), (958, 1459), (958, 1460), (958, 1461),
(958, 1462), (958, 1463), (958, 1464), (958, 1465), (958, 1466), (957, 1466), (957, 1467), (956, 1467),
(955, 1467), (954, 1467), (953, 1467), (953, 1468), (953, 1469), (952, 1469), (952, 1470), (952, 1471),
(951, 1471), (951, 1472), (951, 1473), (951, 1474), (951, 1475), (951, 1476), (951, 1477), (951, 1478),
(950, 1478), (949, 1478), (949, 1479), (949, 1480), (949, 1481), (949, 1482), (949, 1483), (948, 1483),
(948, 1484), (948, 1485), (948, 1486), (948, 1487), (948, 1488), (949, 1488), (949, 1489), (949, 1490),
(948, 1490), (947, 1490), (946, 1490), (946, 1491), (946, 1492), (945, 1492), (944, 1492), (944, 1493),
(944, 1494), (944, 1495), (945, 1495), (945, 1496), (946, 1496), (946, 1497), (946, 1498), (946, 1499),
(946, 1500), (946, 1501), (946, 1502), (945, 1502), (945, 1503), (945, 1504), (946, 1504), (946, 1505),
(946, 1506), (946, 1507), (946, 1508), (946, 1509), (947, 1509), (948, 1509), (948, 1510), (948, 1511),
(948, 1512), (949, 1512), (949, 1513), (949, 1514), (949, 1515), (948, 1515), (948, 1516), (948, 1517),
(948, 1518), (948, 1519), (948, 1520), (947, 1520), (946, 1520), (945, 1520), (945, 1521), (945, 1522),
(945, 1523), (946, 1523), (946, 1524), (947, 1524), (948, 1524), (948, 1525), (948, 1526), (948, 1527),
(948, 1528), (948, 1529), (948, 1530), (949, 1530), (949, 1531), (950, 1531), (950, 1532), (950, 1533),
(950, 1534), (950, 1535), (950, 1536), (950, 1537), (950, 1538), (950, 1539), (950, 1540), (950, 1541),
(949, 1541), (949, 1542), (949, 1543), (948, 1543), (947, 1543), (947, 1544), (947, 1545), (947, 1546),
(947, 1547), (946, 1547), (946, 1548), (946, 1549), (945, 1549), (945, 1550), (944, 1550), (944, 1551),
(943, 1551), (943, 1552), (943, 1553), (943, 1554), (943, 1555), (943, 1556), (943, 1557), (943, 1558),
(943, 1559), (943, 1560), (944, 1560), (944, 1561), (944, 1562), (943, 1562), (942, 1562), (942, 1563),
(942, 1564), (942, 1565), (942, 1566), (941, 1566), (941, 1567), (941, 1568), (941, 1569), (941, 1570),
(941, 1571), (941, 1572), (941, 1573), (941, 1574), (941, 1575), (941, 1576), (941, 1577), (941, 1578),
(941, 1579), (941, 1580), (940, 1580), (940, 1581), (940, 1582), (940, 1583), (939, 1583), (939, 1584),
(939, 1585), (939, 1586), (939, 1587), (939, 1588), (939, 1589), (939, 1590), (940, 1590), (941, 1590),
(941, 1591), (941, 1592), (941, 1593), (942, 1593), (942, 1594), (943, 1594), (943, 1595), (943, 1596),
(943, 1597), (943, 1598), (944, 1598), (944, 1599), (944, 1600), (945, 1600), (945, 1601), (945, 1602),
```

```
(946, 1602), (946, 1603), (946, 1604), (946, 1605), (945, 1605), (945, 1606), (945, 1607), (945, 1608),
(945, 1609), (945, 1610), (945, 1611), (945, 1612), (945, 1613), (945, 1614), (944, 1614), (944, 1615),
(944, 1616), (944, 1617), (944, 1618), (944, 1619), (945, 1619), (945, 1620), (945, 1621), (945, 1622),
(945, 1623), (945, 1624), (944, 1624), (943, 1624), (943, 1625), (943, 1626), (944, 1626), (945, 1626),
(946, 1626), (947, 1626), (947, 1627), (947, 1628), (948, 1628), (949, 1628), (950, 1628), (950, 1629),
(950, 1630), (950, 1631), (950, 1632), (950, 1633), (950, 1634), (950, 1635), (950, 1636), (951, 1636),
(952, 1636), (952, 1637), (953, 1637), (953, 1638), (953, 1639), (952, 1639), (951, 1639), (951, 1640),
(951, 1641), (950, 1641), (949, 1641), (949, 1642), (948, 1642), (948, 1643), (948, 1644), (948, 1645),
(948, 1646), (948, 1647), (948, 1648), (949, 1648), (949, 1649), (949, 1650), (949, 1651), (950, 1651),
(950, 1652), (951, 1652), (952, 1652), (952, 1653), (952, 1654), (952, 1655), (951, 1655), (950, 1655),
(950, 1656), (950, 1657), (950, 1658), (950, 1659), (950, 1660), (950, 1661), (951, 1661), (951, 1662),
(951, 1663), (951, 1664), (950, 1664), (950, 1665), (950, 1666), (950, 1667), (950, 1668), (950, 1669),
(949, 1669), (949, 1670), (948, 1670), (948, 1671), (948, 1672), (949, 1672), (950, 1672), (951, 1672),
(951, 1673), (951, 1674), (952, 1674), (953, 1674), (954, 1674), (955, 1674), (956, 1674), (956, 1675),
(957, 1675), (957, 1676), (957, 1677), (957, 1678), (957, 1679), (957, 1680), (957, 1681), (956, 1681),
(956, 1682), (956, 1683), (956, 1684), (956, 1685), (956, 1686), (956, 1687), (956, 1688), (956, 1689),
(956, 1690), (955, 1690), (955, 1691), (954, 1691), (954, 1692), (954, 1693), (954, 1694), (955, 1694),
(956, 1694), (956, 1695), (956, 1696), (957, 1696), (958, 1696), (958, 1697), (958, 1698), (958, 1699),
(958, 1700), (958, 1701), (958, 1702), (958, 1703), (958, 1704), (958, 1705), (958, 1706), (959, 1706),
(959, 1707), (959, 1708), (959, 1709), (959, 1710), (959, 1711), (958, 1711), (958, 1712), (958, 1713),
(959, 1713), (959, 1714), (960, 1714), (960, 1715), (960, 1716), (960, 1717), (960, 1718), (959, 1718),
(959, 1719), (959, 1720), (959, 1721), (960, 1721), (960, 1722), (961, 1722), (962, 1722), (962, 1723),
(963, 1723), (963, 1724), (964, 1724), (964, 1725), (965, 1725), (965, 1726), (965, 1727), (965, 1728),
(966, 1728), (967, 1728), (967, 1729), (968, 1729), (968, 1730), (969, 1730), (969, 1731), (969, 1732),
(968, 1732), (968, 1733), (967, 1733), (967, 1734), (967, 1735), (966, 1735), (966, 1736), (966, 1737),
(967, 1737), (968, 1737), (968, 1738), (968, 1739), (968, 1740), (968, 1741), (968, 1742), (968, 1743),
(969, 1743), (969, 1744), (969, 1745), (970, 1745), (970, 1746), (971, 1746), (972, 1746), (972, 1747),
(972, 1748), (972, 1749), (972, 1750), (972, 1751), (972, 1752), (973, 1752), (974, 1752), (974, 1753),
(974, 1754), (974, 1755), (975, 1755), (976, 1755), (976, 1756), (976, 1757), (976, 1758), (977, 1758),
(978, 1758), (979, 1758), (979, 1759), (979, 1760), (980, 1760), (980, 1761), (980, 1762), (980, 1763),
(981, 1763), (982, 1763), (982, 1764), (983, 1764), (984, 1764), (985, 1764), (985, 1765), (985, 1766),
(985, 1767), (985, 1768), (985, 1769), (984, 1769), (984, 1770), (983, 1770), (983, 1771), (983, 1772),
(984, 1772), (984, 1773), (984, 1774), (984, 1775), (984, 1776), (984, 1777), (984, 1778), (983, 1778),
(983, 1779), (983, 1780), (984, 1780), (984, 1781), (984, 1782), (984, 1783), (984, 1784), (984, 1785),
(984, 1786), (984, 1787), (984, 1788), (985, 1788), (986, 1788), (987, 1788), (987, 1789), (987, 1790),
(987, 1791), (987, 1792), (986, 1792), (986, 1793), (986, 1794), (985, 1794), (984, 1794), (983, 1794),
(983, 1795), (983, 1796), (982, 1796), (981, 1796), (981, 1797), (981, 1798), (981, 1799), (980, 1799),
(980, 1800), (980, 1801), (981, 1801), (981, 1802), (981, 1803), (980, 1803), (980, 1804), (980, 1805),
(979, 1805), (979, 1806), (979, 1807), (979, 1808), (978, 1808), (977, 1808), (976, 1808), (976, 1809),
(976, 1810), (976, 1811), (976, 1812), (976, 1813), (976, 1814), (976, 1815), (976, 1816), (976, 1817),
(976, 1818), (977, 1818), (977, 1819), (977, 1820), (977, 1821), (977, 1822), (977, 1823), (977, 1824),
(978, 1824), (979, 1824), (979, 1825), (979, 1826), (979, 1827), (978, 1827), (978, 1828), (977, 1828),
(976, 1828), (976, 1829), (976, 1830), (976, 1831), (976, 1832), (977, 1832), (977, 1833), (977, 1834),
(977, 1835), (978, 1835), (978, 1836), (978, 1837), (978, 1838), (979, 1838), (980, 1838), (980, 1839),
(980, 1840), (980, 1841), (979, 1841), (979, 1842), (979, 1843), (979, 1844), (979, 1845), (979, 1846),
(979, 1847), (979, 1848), (978, 1848), (978, 1849), (978, 1850), (979, 1850), (979, 1851), (980, 1851),
(980, 1852), (980, 1853), (980, 1854), (980, 1855), (981, 1855), (982, 1855), (982, 1856), (982, 1857),
(982, 1858), (982, 1859), (983, 1859), (984, 1859), (985, 1859), (985, 1860), (985, 1861), (986, 1861),
```

(987, 1861), (988, 1861), (988, 1862), (989, 1862), (989, 1863), (989, 1864), (989, 1865), (989, 1866), (989, 1867), (989, 1868), (988, 1868), (987, 1868), (987, 1869), (987, 1870), (986, 1870), (986, 1871), (986, 1872), (987, 1872), (988, 1872), (988, 1873), (988, 1874), (988, 1875), (989, 1875), (989, 1876), (989, 1877), (989, 1878), (990, 1879), (990, 1880), (991, 1880), (992, 1880), (992, 1881), (993, 1881), (994, 1881), (995, 1881), (996, 1881), (997, 1881), (997, 1880), (998, 1880), (999, 1880)]